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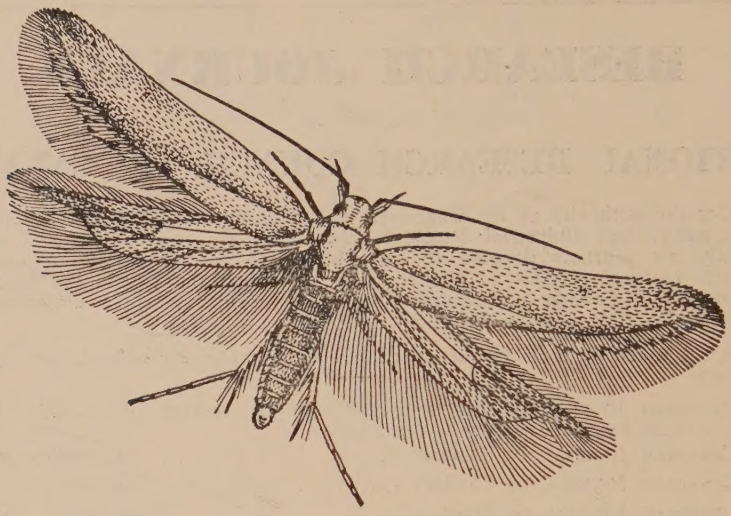

THE ANGOUMOIS GRAIN MOTH

Sitotroga cerealella

This moth is a major pest of grain and seeds, especially in warm, temperate regions. In the U.S.A. it is claimed to be second only in importance to the grain weevil.

Attack begins in the field and continues in the store, where the young larva penetrates into the grain and consumes the contents, often until only the husk remains. The adult then emerges and begins the life cycle again.

As well as causing contamination with excreta, this species can impart a most unpleasant smell to the grain, giving it an unpalatable flavour.

Palmer (M. A.). **Aphids of the Rocky Mountain Region.**—*Thomas Say Foundn* **5,** 9¼ × 6¼ ins., [4+] 452 pp., 8 col. pls., 455 figs., 14½ pp. refs. [Lafayette, Ind., Purdue Univ.] 1952. Price $10.25.

This book is concerned with the taxonomy of the Aphids recorded up to 1950 from native and introduced plants in a region of the Rocky Mountains comprising Colorado, Utah, southern Wyoming, south-eastern and south-central Idaho and northern New Mexico (excluding deserts), where most Aphids of economic importance in the United States, or even North America, occur. The various stages, so far as known, of the various species are described, and their food-plants and distribution within the area are given, with, in most cases, figures and notes on the chief distinguishing characters. A few genotypes that do not occur in the region are included for comparison. There are keys to the species, genera and higher groups, based as far as possible on characters applicable to both alate and apterous viviparae, and others, based on field and laboratory characters, generally of the viviparae, separating the species that occur on each food-plant; the species are also listed according to food-plants. Although the work is not a revision, it contains descriptions of five new species, as well as new synonymy and a few new names.

Obraztsov (N. S.). **Classification of Holarctic Species of the Genus *Lobesia* Guenée, with Description of *Paralobesia* gen. nov. (Lepidoptera, Tortricidae).**—*Tijdschr. Ent.* **96** pt. 1–2 pp. 85–94, 5 figs., 10 refs. Amsterdam, 1953.

The author shows that the characters hitherto used to distinguish *Polychrosis* from *Lobesia* are not of generic value, and from a study of the genitalia revises the classification of the Holarctic species formerly placed in them. *Polychrosis* is restricted to *botrana* (Schiff.) and considered a subgenus of *Lobesia*, and *Paralobesia*, gen. n., is erected for *andereggiana* (H.-S.) (the type) and various Nearctic species formerly included in *Polychrosis*, including *viteana* (Clem.). Lists of the Holarctic species attributed to these genera are given.

Bonnemaison (L.). **Les parasites animaux des plantes cultivées et des forêts.**—668 pp., 301 figs., 11 refs. Paris, Soc. Édit. Ingén. agric., 1953.

This handbook has special reference to conditions in France and contains 13 chapters, of which eight are concerned with insects and one with other invertebrates, including mites. The insects are dealt with systematically and comprise pests of vineyards, fruit and field crops, vegetables, ornamental plants, forest and other trees, and stored products. Brief descriptions of the adult and larva are given for each, with notes on their bionomics and the most effective control measures. General information on the morphology, physiology, bionomics and classification of insects and on methods of controlling them, including a review of modern insecticides, is given in two chapters, and another is devoted to the prevention and control of infestation on fruit trees. A concluding chapter contains tables for the identification of pests, based on the crops or products attacked and the nature of the damage caused.

(1542) Wt. P17/3897 5/54 E.P. Ltd. Gp. 566. [A]

GRIST (D. H.). **Rice.**—8¾ × 5¾ ins., xix + 331 pp., 34 pls. (3 col.), 34 figs., 8 pp. refs. London, etc., Longmans, Green & Co., 1953. Price £1 15*s.*

This comprehensive survey of the cultivation and processing of rice throughout the world includes three chapters in which reference is made to insects. One contains information on the bionomics, economic importance and control of pests that attack the growing plant, one on methods of storage includes notes on the appearance and habits of the more important insects that attack milled and unmilled rice in store and a review of the methods of controlling them, and one on diseases of rice deals very briefly with the symptoms and insect vectors of two virus diseases that attack the crop in Japan.

GRADOYEVIT' (M.). **The First Appearance of the Potato Beetle in Yugoslavia and its Control in the Year 1946.** [*In Serbian.*]—*Plant Prot.* no. 4 pp. 18–34, 7 figs., 1 map. Belgrade, 1951. (With a Summary in French.)

Leptinotarsa decemlineata (Say) was first observed in Yugoslavia in June 1946, when it was found on potato in eastern Slovenia. It had presumably been introduced during the German occupation in 1944, when seed potatoes from Germany were distributed among settlers. Control measures consisting of hand-collection of the eggs, larvae and adults and the use of sprays of 0·5 or 0·7 per cent. lead arsenate in and round infested fields were begun immediately and gave good results, the infested area being reduced from 94 to about 4 sq. miles. Few beetles entered hibernation, and the last example was seen on 13th October. About 5 per cent. of the older larvae present in the first half of September bore Tachinid eggs, and Tachinid adults were captured in infested potato fields.

PREŠERN (T.). **Akcija suzbijanja krumpirove zlatice u 1947 i 1948 god. u NR Sloveniji.** [The Control of the Potato Beetle in the Years 1947 and 1948 in Slovenia.]—*Plant Prot.* no. 4 pp. 35–59, 12 figs., 1 graph, 2 maps. Belgrade, 1951. (With a Summary in French.)

KLAKOČAR (E.). **Suzbijanje krompirove zlatice u NR Sloveniji 1949 god.** [Control of the Potato Beetle in Slovenia in 1949.]—*T.c.* pp. 60–67, 1 fig., 1 map. (With a Summary in French.)

In the first paper, details are given of the campaign against *Leptinotarsa decemlineata* (Say) on potato in Slovenia in 1947–48 [*cf.* preceding abstract]. Much attention was devoted in 1947 to the dissemination of information among the rural population, and in order to prevent the spread of infestation, potatoes were again planted in fields that had been infested in 1946. The organised collection of beetles in such fields was begun in April, and lead-arsenate sprays were applied in June and July. In some instances, the soil in infested fields was treated with carbon bisulphide. The results were satisfactory, and though the infested area increased somewhat during the year, no fresh foci of any importance were formed. The campaign was continued in 1948, when some 900,000 people participated, but was hindered by rain. Hand-collection of the adults before they oviposited was the chief measure, supplemented by chemical control, and most of the foci of infestation were eliminated by June. The total infested area decreased somewhat. Observations in the two years showed that the first overwintered adults appeared at the beginning of May and that two

generations were produced on potato, the adults of the second appearing at the end of July or the beginning of August and entering the soil for hibernation in August. Potato was the only crop attacked.

In the second paper, it is stated that cold rainy weather in April and May 1949 delayed the appearance of the overwintered adults until the end of May or the beginning of June, and only one generation was produced. Based on the numbers of beetles collected, the population reached its peak between 15th June and 15th July, whereas in 1948 it had done so between 25th May and 25th June. Control measures were the same as in the preceding years, but also included the use of a DDT dust against the larvae. Wet weather caused frequent interruptions in the work, but the infested area was again considerably reduced. During June and July, eggs, larvae and a few adults were found in two localities close to the Italian frontier, and further adults were found in the same district in September. Migration from Italy was probably responsible.

Špehar (V.). **Borba protiv krumpirove zlatice u NR Hrvatskoj od 1946–1949 godine.** [The Control of the Potato Beetle in Croatia in the Years 1946–49.]—*Plant Prot.* no. 4 pp. 68–73. Belgrade, 1951. (With a Summary in French.)

Following the discovery of *Leptinotarsa decemlineata* (Say) on potato in Slovenia in 1946 [*cf.* last abstract but one], all potato fields in a belt along the adjoining part of Croatia were sprayed with 0·7 per cent. lead arsenate as a preventive measure. No infestation occurred in that year, but in June and July 1947, eggs, larvae and adults were found in three districts, the total infested area being about 45 acres. The control measures employed were the same as in Slovenia, but preference was given to dusting with DDT against the larvae, and some plots were sprayed with 0·4 per cent. calcium arsenate as a precaution. The beetle spread in 1948, though infestation was not intense, but there was a decrease in 1949, when only small numbers of eggs, larvae and adults were found.

Atanatskovit' (S.). **The Control of the Potato Beetle in Yugoslavia in the Year 1950 and Measures to be undertaken in the Year 1951.** [*In Serbian.*]—*Plant Prot.* no. 4 pp. 74–84, 1 map. Belgrade, 1951. (With a Summary in French.)

Nonveye (G.) [Nonveiller (G.)]. **A Survey of the Control of the Potato Beetle as hitherto carried out in Yugoslavia and our future Tasks in Connection with its Elimination.** [*In Serbian.*]—*T.c.* pp. 89–100, 3 figs. Belgrade, 1951. (With a Summary in French.)

It is stated in the first paper that *Leptinotarsa decemlineata* (Say) spread to potato in further districts in both Slovenia and Croatia in 1950 [*cf.* two preceding abstracts]. In Slovenia, the infested area increased to 500 acres, as compared with 29 acres in 1949, and the heaviest infestation and most rapid spread occurred along the Italian frontier. Infestation was light in the interior. The infested area in Croatia increased to about 21 acres. The usual control measures were applied, and a programme for the organisation of control in 1951 is outlined.

The second paper is a survey of the spread of the beetle and the work on its control in Yugoslavia in 1946–50, and it is pointed out in the course of it that infestation was generally light and damage to potato nowhere serious. Recommendations for 1951 are included.

Ilit' (B.). **Some Observations on the Biology of the Potato Beetle and Tests of the Effectiveness of Insecticides against it in the Environs of Brezhitse in 1946.** [*In Serbian.*]—*Plant Prot.* no. 4 pp. 85–88. Belgrade, 1951. (With a Summary in French.)

Sprays of 0·4–0·7 per cent. lead arsenate were tested against larvae of *Leptinotarsa decemlineata* (Say) on potato in Slovenia in 1946. The 0·7 per cent. spray gave complete mortality on individual plants in 28 hours, and the others in 42 hours, whereas there was no mortality on the controls. When larvae were placed on the sprayed plants at various periods after treatment, it was found that the 0·7 per cent. spray remained effective for 10–15 days and the other two for only 2–3 days. Young larvae that hatched from eggs placed on recently treated plants died rapidly as soon as they began to feed, but the sprays lost their effect in ten days. When adults were placed on plants sprayed with 0·7 per cent. lead arsenate, 98 per cent. died in five days. A DDT preparation gave excellent results against both larvae and adults, but was slower in action than lead arsenate. Clean cultivation was found to lead to a considerable economy in the amount of spray required in the field. In cage tests the larvae did not feed on tobacco, though no other food was available. The females deposited their eggs on the lower surfaces of potato leaves, and the numbers per batch were 4–82, with an average of 26. The eggs hatched in 6–10 days. The larvae entered the soil for pupation through cracks and had difficulty in penetrating hard soil. Pupae occurred at depths of 1–4 ins., depending on the soil structure.

Giulianelli (E.). **Contributo alla conoscenza del** *Ceuthorrynchus picitarsis* **Gyllh.** [A Contribution to Knowledge of *C. picitarsis.*]—*Boll. Ist. Ent. Bologna* **18** (1950–51) pp. 24–29, 3 figs., 5 refs. Bologna, 1952.

Ceuthorrhynchus picitarsis Gylh. causes serious injury to turnip rape in Italy and appears to be increasing its distribution in certain areas. In observations on its bionomics near Cesena in 1948–50, it was found that this weevil has two generations a year. The adults of the overwintering generation emerged in mid-April and fed on the parenchyma of the leaves and young pods. Pairing occurred after a few days, and the females laid their eggs in groups of 2–5 in the leaf veins. On hatching, the larvae mined down the veins until they reached the woody stem and then bored down this until they were full-fed, when they left the plant and pupated in earthen cells just below the surface of the soil. Adults appeared in late May and early June and aestivated until mid-October, when they were found feeding on the leaf stems of young turnip rape about a month old. They paired in autumn, and the females oviposited in the leaf stalks, usually on the inner side, from late October. Some of these adults overwintered and continued to oviposit until mid-March. The duration of the egg stage in winter varied with temperature, but hatching occurred even in mid-winter. The larvae mined the leaf stalks and main stem, descending to the root collar. The first were found there in early November, and the number per plant ranged up to 80 as hatching proceeded. Pupae were present from mid-March.

The most serious damage was due to the larvae that attacked the young plants in autumn, since they caused the leaves to turn yellow and dry up, and later, by accumulating in the collar, prevented the resumption of development in the following year. It is recommended that young leaves and their stalks should be removed from the plants in mid-November, so as to free the plants from the eggs and larvae in them at that time, though this also exposes the plants to frost.

Zangheri (S.). **Contributi alla conoscenza dell'entomofauna delle leguminose da seme. I. Nota preventiva sull'entomofauna del pisello e della fava.** [Contributions to Knowledge of the Insect Fauna of Leguminous Seed Plants. I. Preliminary Note on the Insect Fauna of Peas and Broad Beans.]—*Boll. Ist. Ent. Bologna* **18** (1950–51) pp. 93–116, 10 figs., 53 refs. Bologna, 1952.

Systematic lists are given of the numerous insects recorded as feeding on broad beans or peas in the field in Italy and of 30 observed by the author in Romagna in 1948–50, followed by brief accounts of observations on the bionomics and importance of some of them. The more injurious on broad bean were *Aphis fabae* Scop., which caused severe damage in early summer and autumn and was attacked by numerous parasites and Coccinellids; *Peridroma saucia* Hb. (*Rhyacia margaritosa* (Haw.)), which is polyphagous and apparently had two generations a year, though only the first was observed on broad bean; *Maladera holosericea* (Scop.), which was present in large numbers in coastal areas in 1950, when the adults migrated to broad bean from beet in autumn and destroyed the lower leaves, but had not previously been recorded as injurious in Italy; and *Liriomyza congesta* (Beck.), which mined the leaves, had several generations a year, overwintered in the pupal stage in the soil, and also attacked peas. The last named was parasitised by *Opius* sp. possibly *ilicis* Nixon, *O. pygmaeator* (Nees) and *Dacnusa* sp.

The more injurious on peas were *Sitona lineatus* (L.) and *S. limosus* (Rossi), both of which had two generations a year, the adults feeding on the leaves and the larvae on the roots and nodules, and also attacked broad bean; *Phytomyza atricornis* Mg. [*cf. R.A.E.*, A **23** 505], which mined the leaves, had many generations a year and was parasitised by unidentified species of *Opius*, *Dacnusa*, *Pleurotropis*, *Derostenus* and *Solenotus*; and *Diataraxia* (*Polia*) *oleracea* (L.), of which the first generation attacked peas, *Mamestra* (*Barathra*) *brassicae* (L.) [*cf.* **24** 484] was common on both broad beans and peas. It had two generations a year, the first attacking peas and beans in spring–summer and the second developing on young bean plants in autumn.

Gentilucci (T.). **La** *Cacoecia rosana* **L. nell'Emilia.** [*Tortrix rosana* in Emilia.]—*Boll. Ist. Ent. Bologna* **18** (1950–51) pp. 197–204, 5 figs., 20 refs. Bologna, 1952.

Tortrix (*Cacoecia*) *rosana* (L.) causes considerable damage to fruit trees in the region of Bologna and Ferrara. The author reviews its synonymy and world distribution, shows in a table the food-plants attacked by it in various countries and gives an account of observations on its bionomics near Bologna, where apple, pear, plum and various other trees and shrubs were infested. The adults emerged in May and were present throughout June. Pairing and oviposition occurred 3–4 days after emergence, and the eggs were laid in masses of 20–120 on branches 2–4 years old. The larvae hatched in the following March or April and fed on the young leaves or buds, webbing them together and moving from one to another. They became full-fed in 30–40 days and pupated in the webbed leaves, and the pupal stage lasted 10–20 days. The parasites of *T. rosana* are reviewed from the literature; those reared by the author were *Apanteles* sp. and *Zenillia roseanae* (B. & B.) (*Pseudoperichaeta insidiosa*, auct.).

Zocchi (R.). *Evergestis extimalis* **Scopoli (Lepidoptera Pyralidae).**—*Boll. Ist. Ent. Bologna* **18** (1950–51) pp. 350–379, 25 figs., 37 refs. Bologna, 1952.

Evergestis extimalis (Scop.), the adults, larva and pupa of which are described, causes considerable damage to crucifers in Italy, and observations were made on its bionomics in Emilia and Romagna in 1948–51. It was found that it has two generations a year, of which the first attacked cultivated crops, including radish, rape, turnip rape and cabbage, and the second mainly weeds. The adults emerged in mid-May and paired, and eggs were laid about ten days later in groups of 2–6 on the peduncles and pods or, in the absence of these, on the stems. The larvae hatched in about a week and fed preferably on the pods, internally during the first instar and then externally if the pods were small, moving from one to another. They pupated in the soil in early July, and the adults emerged early in August. As cultivated crucifers are not generally available in August, the females oviposited on weeds, and the resulting larvae overwintered in cocoons in the soil and pupated in the following spring. Larvae of *Apanteles* sp. parasitised 40 per cent. of the larvae of the first generation in 1948; other parasites reared from the larvae comprised a Braconid tentatively considered to be *Bracon* (*Habrobracon*) *hebetor* Say, and an unidentified Ichneumonid. Arsenical sprays are recommended for control.

Zocchi (R.). **Contributi alla conoscenza degli insetti delle foreste. I.** *Cryptorrhynchus lapathi* **L. (Coleoptera Curculionidae).** [Contributions to Knowledge of Forest Insects. I. *C. lapathi.*]—*Boll. Ist. Ent. Bologna* **18** (1950–51) pp. 245–258, 9 figs., 33 refs. Bologna, 1952. **Contributi alla conoscenza degli insetti delle piante forestali. II. Note biologiche sull'***Evetria buoliana* **Schiff. (Lepidoptera Tortricidae).** [Contributions to Knowledge of the Insects of Forest Plants. II. Notes on the Bionomics of *Rhyacionia buoliana.*]—*Redia* **37** pp. 345–369, 13 figs., 31 refs. Florence, 1952.

In the first of these two parts of a series, descriptions are given of the larva and adult of *Cryptorrhynchus lapathi* (L.), which was found causing severe injury to young poplars near Ferrara and Bologna in 1950, and its distribution, food-plants, bionomics and control are reviewed from the literature [*cf. R.A.E.*, A **15** 531; **20** 205, etc.]. Observations showed that the adults emerged in June and July and fed, preferably on young plants, before pairing. The eggs were laid in incisions in the bark and did not hatch until about the following March. The larvae mined beneath the bark for about a month and then entered the wood, pupating in their galleries in mid-June or early July. The pupal stage lasted about 10 days, but the adults remained in the wood for about a week after emergence.

In the second part, all stages of *Rhyacionia* (*Evetria*) *buoliana* (Schiff.) are briefly described, its distribution and food-plants are reviewed, and an account is given of observations on its bionomics on pine in Tuscany, where it has become widespread in recent years. The results are compared and contrasted with those in the literature. The adults emerged from June to mid-July, and the females oviposited mainly on the needles [*cf.* **24** 754], both in the field and in the laboratory. The eggs were occasionally laid singly but more usually in groups of 2–5, and hatched in about a week. The larvae fed in the shoots and overwintered in their galleries, moving from one shoot to another in the following spring. When full-fed, towards the end of May, they pupated within the masses of resin round

infested shoots or in the dead shoots in which they had been blown from the trees by wind. The pupal stage lasted 3–4 weeks, and there was only one generation a year.

The species of pine attacked included *Pinus contorta* var. *latifolia* (*murrayana*), from which *R. buoliana* has not previously been recorded, and it was observed in mixed stands of *P. pinea* and *P. pinaster* that the latter was much the more severely attacked, the former often remaining uninjured. The malformations resulting from infestation of the terminal shoots are described.

Lists are given from the literature of 80 known parasites and a few hyperparasites and predators of *R. buoliana*. The parasites reared by the author were *Ephialtes buolianae* (Htg.), *Eulimneria rufifemur* (Thoms.) [**24** 755], *Tetrastichus turionum* (Htg.) [**25** 593], *Apanteles* sp. (probably *A. sicarius* Marsh.), *Trichomma enecator* (Rossi) (from the pupae) and *Bethylus fuscicornis* (Jurine), of which the last three had not previously been recorded from *R. buoliana*.

The control measures recommended include the removal of infested shoots in May, when they are easily identified by the resin masses, and their preservation in cages that permit the emergence of parasites.

Séguy (E.). **Un nouveau *Phytomyza* parasite des oeillets cultivés (Dipt. Agromyzidae).**—*Ann. Mus. Stor. nat.* **64** (1949–51) pp. 56–61, 1 fig., 9 refs. Genoa, 1951.

Ciampolini (M.). **La *Pseudonapomyza dianthicola* Venturi (Dipt. Agromyzidae). Note sulla morfologia, sulla biologia e sui mezzi di lotta).** [*P. dianthicola*. Notes on its Morphology, Bionomics and Control.]—*Redia* **37** pp. 69–120, 33 figs., 10 refs. Florence, 1952.

In the first paper, *Phytomyza jannonei* sp.n., is described from adults of both sexes reared from the leaves of carnation in the Province of Genoa, Italy, in 1949.

In the second, the author states that Séguy subsequently considered *P. jannonei* to be a synonym of *Pseudonapomyza dianthicola* Venturi [*cf. R.A.E.*, A **41** 107], describes all stages of this Agromyzid, and gives an account of observations on its bionomics on carnation near Pistoia and on its parasites in 1949–51 [*cf. loc. cit.*]. Of the three parasites obtained, *Halticoptera patellana* (Dalm.) was less numerous in 1950–51 than in 1949, its place being taken by *Solenotus isaea* (Wlk.), which gave almost complete control of the Agromyzid in several districts. The life-cycle of this Eulophid lasted about 16 days, depending on temperature, and there were many generations a year. It was active from April to mid-November and overwintered in the pupal stage in the host mines. In 1950, adults were reared in the laboratory and liberated in infested plantings in Pistoia from April onwards. The percentage parasitism of the larvae obtained was 58 in June, 75 in July–August, and 90–95, and even 98, in September–October.

In further tests on control [*cf. loc. cit.*], DDT dusts were applied at about the time of emergence of the adults of the overwintered and succeeding generations. The treatment was effective for the 2–3 months, but then failed owing to reinfestation from neighbouring untreated plants and overlapping of the generations, which led to almost daily emergence. Parathion was ineffective against the eggs, but gave good mortality of the larvae if applied in sprays at high concentrations to the lower surfaces of the leaves, and was very effective against the adults, though it lost its toxicity in 4–5 days. Alternate treatments with parathion against the larvae and DDT against the adults of the early generations gave 70–80 per

cent. mortality, but killed the parasites, so that by August infestation was heavier in the treated plots than on the control plants, on which parasitism had reached 95 per cent.

Melis (A.). **Esperienze di lotta contro la mosca delle olive nella Toscana litoranea nel 1951.** [Experiments on the Control of *Dacus oleae* on the Coast of Tuscany in 1951.]—*Redia* **37** pp. 121–161, 10 figs., 5 refs. Florence, 1952.

A detailed account is given of further tests on the control of *Dacus oleae* (Gmel.) on olive on the coast of Tuscany [*cf. R.A.E.*, A **41** 342, etc.] carried out in 1951, when infestation, as judged by the catches of adults in bait-pans, began in July and became intense in September–October. In the first of the three experimental areas, four effective applications, made between mid-July and early October, of emulsion sprays containing 3 or 4 per cent. of a solid product containing technical DDT that was first ground and melted, or 3 or 4 per cent. of a mixture of 25 per cent. each of DDT and γ BHC, gave little or no control of infestation. In the second, sprays of 0·1 per cent. Pestox 3 H [which contains schradan] were applied on 20th July, 23rd August, 22nd September and 4th October, an emulsion spray of 0·125 per cent. toxaphene on 12th and 21st October, a spray of 2 per cent. of a dieldrin emulsion concentrate on about the same dates as Pestox, Colloidal Dacus (a spray product of the activated-sulphur type that protects the olives from infestation) five times between 22nd June and 5th October, and the Berlese bait-spray of 2·5 lb. sodium arsenite and 100 lb. beet molasses diluted 1 : 10 in water either according to Berlese's method six times between early July and late October or according to Bellio's modification of it [**41** 343]; the remaining treatments were parathion sprays and dusts, the main results of which have already been noted [**41** 347], though the parathion spray product is here stated to have contained only 15 per cent. toxicant. Pestox, toxaphene and Colloidal Dacus were all ineffective, but dieldrin reduced the percentage infestation on two varieties in mid-October from about 97 for no treatment to about 64. The bait-sprays reduced it to about 70–80 per cent., and there was little difference between the two methods of application. In the third area, five applications of the bait-spray between late June and mid-October by Berlese's method gave considerable control, reducing the percentage infestation from 71·4–100 to 5·4–16·2.

Ciampolini (M.). **Note biologiche sul *Phytonomus arator* L. (Coleoptera Curculionidae).** [Notes on the Bionomics of *Hypera arator*.]—*Redia* **37** pp. 167–173, 4 figs., 6 refs. Florence, 1952.

Hypera (*Phytonomus*) *arator* (L.) was found on carnation in the Province of Pistoia, Italy, in the spring of 1949, but caused little damage. Observations on its bionomics in 1949–50 showed that the overwintered adults appeared in the second half of March and fed on the foliage. Pairing occurred until early May, and the females laid 18–30 eggs each, usually in groups of 2–3, in cavities formed in the upper surface of the leaves. The eggs were found in late March or early April and hatched in 7–10 days. The larvae, which were first observed on 2nd April, migrated to the leaf axils and fed on the central buds, later moving from plant to plant. They became full-fed in 15–24 days and pupated in silken cocoons on the leaves, the prepupal and pupal stages lasting 4–5 and 10–15 days, respectively. The

newly emerged adults fed voraciously for a time and then aestivated in the soil. A few were observed feeding in September, and all then hibernated beneath the bark of trees or under débris. Pairing did not occur until the following spring. The weevil was observed only on carnation near Pistoia, but it has been recorded from other food-plants in the literature, which is briefly reviewed. It can be controlled by hand-collection of the cocoons and adults and by sprays of DDT or BHC, which gave good results against the larvae and adults in 1950.

Melis (A.) & Marinari (A.). **Nuovo contributo alla ricerca dei mezzi di lotta contro il cleono delle bietole** (*Temnorrhinus mendicus* **Gyll.**). [A new Contribution to Research on Methods of controlling *Cleonus mendicus* on Beet.]—*Redia* **37** pp. 283–308, 3 figs., 1 ref. Florence, 1952.

In field-plot experiments in 1952 on the control of *Cleonus* (*Temnorrhinus*) *mendicus* (Gylh.) on beet in the Province of Livorno, Italy, with various insecticides, sprays of DDT, chlordane and BHC were applied 2–4 times. Treatment was begun at the end of March or the beginning of April, when the plants showed two leaves, but heavy rain followed the first application and it was repeated on 7th–10th April. Subsequent applications were made on 15th–17th and 22nd–28th April and 2nd–8th May. DDT was applied at 0·2 per cent. in a wettable powder, and many adults were found paralysed 24 hours after the first application. Mortality was high after 48 hours, but many adults were still feeding after 3–4 days. Reinfestation subsequently occurred, however, and about 60 per cent. of the crop was eventually destroyed, even after four treatments. Chlordane was applied at 0·2 per cent. in an emulsion concentrate for the first two sprays and in a wettable powder for the last two; four applications gave the best results and increased the percentage of uninjured roots from 21·4 to 70·4. BHC was applied as 0·2 and 0·4 per cent. of wettable powders containing 16 and 15 per cent. pure γ isomer, respectively, and as 0·4 per cent. of another containing 15 per cent. γ isomer in technical BHC, and four applications of these materials increased the percentage of undamaged roots from 2·8 to 13·5, from 24 to 73·2 and from 31 to 65·2, respectively, fewer applications being less effective.

Parathion was applied once on 8th April or three times on 8th, 16th and 21st April at 0·04 per cent. in an emulsion spray. Some adults were found dead 24 hours after the treatments, but almost all the plants were attacked, even after three applications, though damage was not very severe. Schradan was applied in an emulsion spray at 0·07 per cent. on 8th April, after which a few living adults were found but no dead ones, and again at 0·27 per cent. on 13th April, after which only dead ones were found, but it gave no control of infestation. A single application at 0·33 per cent. on 30th May had no effect on the larvae.

Notes are given on the bionomics of *C. mendicus* [*cf. R.A.E.*, A **18** 561] as observed in the course of the work. The overwintered adults emerged from the soil in early March, and pairing and oviposition occurred until about mid-June. The first eggs were laid in mid-April, and many larvae were present towards the end of May; some were ready to pupate in mid-June. Many larvae taken to the laboratory in June pupated at the beginning of July, and the adults emerged from 17th July onwards. They did not oviposit, but larvae in early instars were found in the field in September. Notes on other insects observed attacking the crop are appended.

Ciampolini (M.). **La comparsa del** *Macrocerococcus superbus* **Leon. (Hemiptera Coccoidea) in Toscana su nuove piante ospiti.** [The Appearance of *Puto superbus* on new Food-plants in Tuscany.]—*Redia* **37** pp. 327–331, 1 fig., 20 refs. Florence, 1952.

Puto (*Macrocerococcus*) *superbus* (Leon.), a polyphagous mealybug that occurs in the Mediterranean basin, southern Russia, Germany and Persia, was found on carnation and gladiolus in the Province of Pistoia in 1952. It had previously been known in Italy only from Calabria, and these food-plants are not among those so far recorded, which are shown in a list. Notes on its bionomics, about which little is known, are given from the literature. In Pistoia, adult females were found in late May, singly or in groups of 2–3, attached to the nodes on the stem or to the leaves. They migrated from one plant to another and entered the soil in mid-June.

Martelli (A.). **Sulla presenza in Toscana del** *Criocephalus* (*Cephalocrius*) *syriacus* **Reitt.** [The Presence of *C. syriacus* in Tuscany.]—*Redia* **37** pp. 479–486, 2 pls., 7 figs., 3 refs. Florence, 1952.

In 1950–51, samples of *Pinus pinaster* attacked by *Dioryctria splendidella* (H.-S.) from two places in Tuscany were found to be severely infested by *Criocephalus syriacus* Rttr. The larvae and adults of this Cerambycid are described, and characters distinguishing the latter from those of other species of the genus are given. The larvae excavated vertical galleries in the wood and pupated in cells between the bark and the sapwood. The adults left the logs in June and July, but one was found still in the wood four months after emergence and was presumably preparing to hibernate.

Sachtleben (H.). **Die parasitischen Hymenopteren des Fichtenborkenkäfers** *Ips typographus* **L.** [The Hymenopterous Parasites of *I. typographus*.]—*Beitr. Ent.* **2** no. 2–3 pp. 137–189, 92 refs. Berlin, 1952.

This paper is based on a study of the Hymenopterous parasites and hyperparasites reared from *Ips typographus* (L.) in Germany in 1948–49, during outbreaks of that bark-beetle on spruce, the collections of the German Entomological Institute, and published records from Germany and some neighbouring countries. *Rhopalophorus* (*Eustalocerus*) *clavicornis* (Wesm.), *Cosmophorus klugii* Ratz. and *Tomicobia seitneri* (Ruschka) are recorded as parasites of the adults, and *Coeloides bostrichorum* Giraud, *Bracon stabilis* Wesm., *Spathius brevicaudis* Ratz., *Dendrosoter middendorffii* (Ratz.), *Pachycrepoideus xylophagorum* Ratz., *Rhopalicus tutela* (Wlk.), *Cheiropachus colon* (L.), *Eurytoma arctica* Thoms. and *E. morio* Boh. as parasites of the larvae. *E. arctica* and *E. morio*, of which *E. auricoma* Mayr and *E. ischioxanthos* Ratz. have recently been shown by Ferrière to be synonyms, respectively, are also sometimes hyperparasitic, their known primary hosts then being *R. tutila* and *Coeloides bostrichorum*, respectively. Larvae of *T. seitneri* are parasitised by *Amblymerus* (*Eutelus*) *typographi* (Ruschka). The adults of all these species are described, and a key to them is followed by notes on their synonymy, distribution, alternative hosts and bionomics, based on the literature. The information available is considered insufficient for any conclusions to be drawn as to their relative importance in controlling or preventing outbreaks of the bark-beetle.

Schwenke (W.). **Unsicherheitsfaktoren bei der Kiefernspannerprognose und Möglichkeiten ihrer Überwindung. Mit einer Ermittlung der Nadelverbrauchsnormen und kritischen Zahlen von** *Bupalus piniarius* **L. und** *Semiothisa liturata* **Cl.** [Sources of Error in Forecasts of Injury by Pine Geometrids and Possibilities of overcoming them. With an Evaluation of average Needle Consumption and critical Densities for *B. piniarius* and *S. liturata*.]—*Beitr. Ent.* **2** no. 2–3 pp. 189–243, 26 refs. Berlin, 1952.

Current methods of forecasting the extent of injury to pine forests by *Bupalus piniarius* (L.) and *Semiothisa liturata* (Cl.) in Germany are usually based on calculated critical population densities for larvae and pupae obtained either by comparing the extent of injury in previous years with the pupal density for the preceding generation, or by determining experimentally the quantity of needles destroyed by the larvae. The first of these methods gives results that are not comparable from year to year or place to place and involves many unpredictable variables, such as the sex ratio and the mortality of adults, eggs and larvae. Accepted techniques for the second method are critically examined, sources of error are pointed out, and a procedure is described that eliminates these so far as possible.

Larvae were reared under simulated field conditions on pine twigs kept in water, one needle from each pair having been removed and stored under dry conditions. The twigs were renewed at intervals, and all remaining unconsumed or partly consumed needles, needles so damaged that their loss from the tree was inevitable, and larval excreta were separately removed to a desiccation chamber. The dry weights of the undamaged needles originally removed were then compared with those of the other groups; and the quantity destroyed per larva was calculated and converted to fresh weight. The results obtained for *B. piniarius* and *S. liturata* on pine and for the latter on spruce were 3·03, 2·7 and 1·62 gm., respectively, and it is calculated from these figures that the numbers of larvae required to destroy 1 kg. of fresh needles are 350, 370 and 620, respectively. The numbers of female pupae needed to produce these larval populations were calculated by dividing the figures obtained by the average numbers of eggs laid per female, which were shown in laboratory tests in 1951 to be 115 for *B. piniarius* and 76 for *S. liturata*, it being assumed that there was no mortality of eggs or larvae or of females before oviposition. This gave critical values of 3 and 5 female pupae per kg. of fresh needles, respectively. The weight of pine needles in a stand can be calculated from the size and vigour of the trees, and converted to weight per unit area.

In making forecasts, pupal counts should be made at the centre of a stand and beneath the crowns of the trees [*cf. R.A.E.*, A **41** 337]. If the population density of the females approaches the critical value, a further more accurate test should be made to discover whether the larval density will reach the critical level. This is done by caging pairs of adults on the trees, observing the numbers of eggs laid and the mortality of the eggs, and hence calculating the larval density which is then compared with the critical figure for the species.

Tielecke (H.). **Biologie, Epidemiologie und Bekämpfung des Rübenderbrüsslers (*Bothynoderes punctiventris* Germ.).** [Biology, Epidemiology and Control of *Cleonus punctiventris*.]—*Beitr. Ent.* **2** no. 2–3 pp. 256–315, 10 figs., 60 refs. Berlin, 1952.

The outbreak of *Cleonus* (*Bothynoderes*) *punctiventris* (Germ.) on beet in Sachsen-Anhalt in 1948–49 [*cf. R.A.E.*, A **40** 324] led to investigations in

1950 on the bionomics and control of that weevil, and the results are here recorded in detail and compared with published information from other countries, notably the Soviet Union [*cf.* **30** 64–71]. The following is based on the author's summary.

The overwintered adults did not emerge from the soil in spring until the temperature exceeded 8°C. [46·4°F.] at a depth of 4 ins. and soil humidity was sufficiently low. They were active for some time in the previous year's beet fields and then migrated to fresh fields between mid-April and June. Males emerged before females but when migration, which occurred in waves, was at its peak, the two sexes were present in equal numbers. Flight occurred only in sunlight and at air temperatures exceeding 22°C. [71·6°F.], but no mass flight was observed in 1950. Anatomical investigations indicated that feeding is not essential for maturation, but several Chenopodiaceae and closely related plants were attacked in field and laboratory tests. Pairing and oviposition occurred in May–July, 80–100 eggs being deposited per female. Adults survived in the field for four months with no difference between the sexes, and individuals kept without food in the laboratory lived for up to 2½ months. Development from egg to adult lasted 2½ months, and only the newly emerged adults in the pupal cells overwintered, usually about 4 ins. beneath the soil surface.

The occurrence of outbreaks is governed mainly by weather, and in particular by the rainfall in May and June, though rainfall between March and the beginning of May determines the extent of injury to beet. Very low rainfall in May–June 1947 favoured the weevil [*cf.* **40** 324] and contributed to the outbreak of 1948–49. Overwintering adults were very resistant to cold. No parasites were observed, but predators gave some control. Those recorded included *Silpha obscura* L. and *Pterostichus punctulatus* (Schall.), which attacked the adults in trap-trenches. Entomophagous fungi attacked over 11 per cent. of the larvae, pupae and young adults in the soil in August.

The control methods tested comprised the use of trap-trenches and chemical treatments. The trenches should be dug in beet fields of the previous year, to catch the migrating adults, and it is advantageous to dust them with parathion when migration reaches its peak. In experiments against adults in new beet fields with proprietary insecticides containing unspecified proportions of DDT, BHC or parathion, dusts were superior to sprays and parathion gave the best results. Watering the plants with a diluted parathion emulsion concentrate (E 605 f) caused some mortality of the larvae and was followed by a high incidence of fungus disease among them, but had no effect on the pupae.

Pasquier (R.), de Luca (Y.) & Maurel (H.). **Essai de traitements au champ contre la bruche des lentilles.**—*Ann. Inst. agric. Algér.* **4** fasc. 10 pp. 1–11. Algiers, 1950.

Field-plot tests on the control of *Bruchus lentis* Froel. on lentils were carried out in Algeria in 1949. Sprays containing 1·5 lb. technical DDT or BHC (12–13 per cent. γ isomer) or 0·4 lb. parathion per 100 gals. were applied at the rate of about 90 gals. per acre. The first applications on 5th May were immediately washed off by three days of rain and were repeated on 10th May. All plots received a second application on 17th May and one a third application of DDT on 24th May, and the lentils were harvested on 17th June, threshed on 28th–30th June and stored in paper bags. Emergence of adult Bruchids was observed from the beginning of July, and examination on 21st–29th October showed that they had pierced many of the bags, 15, 12, 5 and 3 of 15 bags containing lentils from plots

receiving no treatment or treated with DDT, BHC and parathion, respectively, being pierced. Examination of more than 500 lentils from those receiving no treatment or treated with BHC or parathion showed that averages of 45·2, 6·5 and 3·1 seeds per 1,000, respectively, had been attacked by the Bruchid.

It is concluded that at the rates tested, 2–3 effective applications of DDT gave no control of *B. lentis*, whereas two of BHC or parathion, the first soon after the formation of the first pods and the second 8–10 days later, gave considerable control. Although the difference between these was not significant, it appeared possible that parathion was rather more effective than BHC and that the latter should be tested at higher rates.

Smirnoff (W.). *Chrysopa vulgaris* **Schneider prédateur important de** *Parlatoria blanchardi* **Targ. dans les palmeraies de l'Afrique du Nord (Planip. Chrysopidae).**—*Bull. Soc. ent. Fr.* **58** no. 9 pp. 146–152, 5 figs. Paris, 1953.

Brief descriptions are given of all stages of *Chrysopa vulgaris* Schneider, which was found attacking *Parlatoria blanchardii* (Targ.) on date palms in Tunisia, Algeria and Morocco. In observations, the adults survived for 5–7 days in summer and 2–3 weeks at other seasons, and fed, paired and oviposited at night. They fed mainly on the crawlers of *P. blanchardii* but also consumed the nectar and pollen of the flowers in spring and the juice of the ripe dates in autumn. When lucerne or beans beneath the palms were infested by Aphids, they fed on these, but the eggs were always laid on the palms, and the larvae did not occur on the cover crop. The females laid 34–42 eggs each in the laboratory. In the field, the eggs usually occurred on the leaflets or, in autumn, on the fruits, as many as 21 being observed on one date. The egg stage lasted 8–10 days in spring, but averaged about 5–6 days later in the year. The larvae attacked the Coccids beneath the scales, became full-fed in 2–3 weeks, or sometimes longer in winter, and were most voracious in the last instar. They were also observed attacking the larvae and pupae of other insects, including *Chilocorus bipustulatus* (L.), and larvae of their own species. It is estimated that they destroy some 200–300 scales during their development. They pupated in cocoons on the leaflets, usually at the base, and the pupal stage lasted 18–35 days, though it was prolonged to several months in extreme heat or cold by the occurrence of a diapause. There were five generations in the year, but only the first two were complete, some of the adults of the others not emerging until the following spring. Adults were most numerous in spring and autumn, at the times when the eggs of *P. blanchardii* were hatching. The larvae formed 11·9–22·6 per cent. of the predacious insects attacking *P. blanchardii* in six localities, and were the most active of all the predators observed.

Roblot (M.). **Le criquet nomade** (*Nomadacris septemfasciata* **Serv.) au Soudan français.**—*Agron. trop.* **6** no. 11–12 pp. 565–605, 42 figs., 25 refs. Nogent-sur-Marne, 1951.

Nomadacris septemfasciata (Serv.), which was recorded from the Niger inundation area in the French Sudan in 1939 [*cf. R.A.E.*, A **27** 571], appeared to be increasing in 1940–45 and had spread by 1946–48 beyond the area between the Niger, the Diaka and Lake Debo, where large swarms occurred in 1947–48. In this area, there is a dry season from November to April and rains from May to October, reaching their maximum in August.

The level of the Niger and its tributary the Bani varies by nearly 20 ft. during the year, and large areas are flooded at high water.

Although body measurements showed that there was some tendency towards phase *congregans* in 1945 and swarms of adults reached a density of 30–36 per sq. yard in November 1946, only phase *solitaria* was observed until 1947, when there was a definite trend towards phase *congregans* in hopper bands. The percentage of individuals in this phase reached 75–100 in the early instars in dry places, but decreased to 1–3 per cent. in the sixth instar; adults were all of the solitary type. The author describes the six hopper instars in both phases and the adults in various stages of maturity and gives an account of the life-history in the area. There is one generation in the year, and pairing takes place only during a limited period in June and July after the beginning of the rains, when the temperature is 28–32°C. [82·4–89·6°F.]. Egg-pods containing 50–70 eggs are laid in July and August, and favourable conditions for survival appear to include a July rainfall not exceeding about 6–7 ins., as heavier rains would flood hollows and destroy the egg-pods. Hoppers are present from August to early October, and the flooding of the Niger tends to disperse them both directly and also indirectly, because of the abundant vegetation that follows the floods. Bands in phase *congregans* have been found only on high land above the flood plain.

It is concluded that the Niger plains are unlikely to constitute an outbreak area of *N. septemfasciata* under the present climatic conditions, but primary bands may be formed in seasons of deficient rainfall and low floods. Since the floods appear to be increasing each year at present, the activity of *Nomadacris* is likely to decrease.

Lavabre (M.). **Sur une plante pouvant héberger la punaise du caféier, *Antestia lineaticollis* S/sp. *intricata* Ghesq. et Carayon.**—*Agron. trop.* **7** no. 2 pp. 150–151. Nogent-sur-Marne, 1952.

The author reviews the literature on the feeding of Pentatomids of the genus *Antestiopsis* (*Antestia*) [*cf. R.A.E.*, A **42** 50] on plants other than coffee [*cf.* **30** 564; **31** 520] and reports that large numbers of *A.* (*A.*) *intricata* (Ghesq. & Carayon) [**41** 14], which he treats as a subspecies of *A.* (*A.*) *lineaticollis* (Stål), were found on 29th May 1951 on *Solanum anomalum* growing near coffee in the Ivory Coast, when the bugs were very scarce on the coffee itself. They pierced the fruits and stems of the weed, but did not appear to cause the malformations observed on coffee. In experiments, adults confined on *S. anomalum* paired and oviposited as readily as on coffee, but died sooner. Many nymphs reared on the plant died in the second instar, but others developed to the adult stage more rapidly than those on coffee. As *S. anomalum* is abundant round certain coffee plantings and provides shelter and food for the bugs when coffee provides least, it should be destroyed, though it might be used as a trap crop and treated with insecticides at regular intervals.

Matthee (J. J.). **The Occurrence of the Army Worm (*Laphygma exempta* (Walk.)) in and around Pretoria.**—*J. ent. Soc. S. Afr.* **15** no. 2 pp. 122–128, 4 refs. Pretoria, 1952.

The following is very largely the author's summary and conclusion. Data collected during surveys in and near Pretoria in 1944–47 provided no evidence in support of Hattingh's theory of the periodicity of outbreaks of *Laphygma exempta* (Wlk.) in South Africa [*R.A.E.*, A **30** 610]. The fact

that larvae were not found during May–December, though outbreaks occurred in January–April in each year of the investigation, contradicts his suggestion that outbreaks originate from small permanent local populations that build up to outbreak numbers when conditions favour multiplication. The outbreaks round Pretoria must therefore have originated elsewhere [*cf.* **32** 285], probably in the frost-free areas of the lowveld in the Transvaal or in Portuguese East Africa, Northern or Southern Rhodesia, or even farther north.

Lochner (E. H. W.). **Preliminary Experiments with systemic Insecticides for the Control of the Cabbage Aphid** (*Brevicoryne brassicae* **Linn.**).— *Sci. Bull. Dep. Agric. S. Afr.* no. 333, 14 pp., 10 figs., 2 refs. Pretoria, 1952.

The effectiveness of systemic insecticides against *Brevicoryne brassicae* (L.) on cabbage was investigated in the laboratory in South Africa. The compounds tested were Pestox 3 (containing a number of dimethyl amide phosphoric acids, of which those with insecticidal properties were schradan and triphosphoric acid penta(dimethylamide) [*cf. R.A.E.*, A **41** 349]), Pestox 14 (containing bis(dimethylamino) fluorophosphine oxide and other alkyl amines), Pestox 15 (bis(monoisopropylamino) fluorophosphine oxide) and Pestox 16 (bis(monomethylamino) fluorophosphine oxide), all as aqueous solutions containing 0·4 per cent. active ingredient, and young cabbage plants, each with five fully expanded leaves, in pots, were used as test plants. The insecticides were applied with a brush to the lower surface of four of the leaves on each plant, either the oldest or the youngest being omitted, at a rate of 0·2 ml. per plant, the Aphids were confined in perforated celluloid cages on the upper surface of the leaves 24 hours later, and mortality counts were made daily for six days; further six-day exposures were made on the leaves 10, 20, 30 and 40 days after treatment. When the Aphids were exposed on the treated leaves only, Pestox 14 and 15 were the most toxic, though the initial action of the former was slow, and both gave complete mortality in 4–5 days when the exposure began 24 hours after treatment; Pestox 3 was the least toxic. There was a marked reduction in effectiveness ten days after treatment, when Pestox 16 had become relatively ineffective, but Pestox 14 gave fairly high mortality even after 20 days. Total mortalities were lower for all treatments when Aphids on the untreated leaves were included in the counts, but the relative effectiveness of the four materials was similar. A comparison of mortalities on untreated and treated leaves of the same plants indicated that all the materials, and especially Pestox 16 and 14, were translocated more readily to old than to young untreated leaves. The order of decreasing initial effectiveness on untreated leaves was Pestox 16, Pestox 14, Pestox 15 and Pestox 3 for old leaves and Pestox 3, Pestox 14, Pestox 15 and Pestox 16 for young ones. All except Pestox 14 showed a marked drop in effectiveness by the tenth day, when Pestox 3 and Pestox 16 were virtually non-toxic and the differences in mortality on old and young untreated leaves tended to disappear. As mortality was higher on treated than on untreated leaves, it is important to obtain good coverage when spraying with these insecticides.

In tests on the value of soil applications, Pestox 3 was applied to the soil in the pots at rates of 2·5, 5 and 10 ml. of the solution per plant and Aphids were exposed on the upper surfaces of the second and fourth leaves from the bottom of each plant 24 hours and 10, 20, 30 and 40 days after treatment. All treatments proved toxic, the highest rate giving complete mortality in six days in the initial exposure, and effectiveness decreased

with the rate except after 30 days, when the highest rate proved less effective than the second. At the two lower rates, the action of the compound was slower and the mortalities obtained lower than when it was applied to the leaves; at the highest rate, however, soil treatment was the better. Furthermore, it resulted in higher mortalities after ten days at all rates of application, and this superiority was maintained for 20 days following treatment at 10 ml. per plant and for 30 days at 5 ml., though the difference then was slight.

Le Pelley (R.). **Insecticidal Treatments against the Mealybug Ant (*Pheidole punctulata*) on Coffee.**—*Mon. Bull. Coffee Bd Kenya* **18** no. 216 p. 569. Nairobi, 1953.

In tests in Kenya in 1951 on the control of the ant, *Pheidole punctulata* Mayr, which attends the coffee mealybug [*Planococcus* (*Pseudococcus*) *kenyae* (Le Pelley)] on coffee [*cf. R.A.E.*, A **27** 665], sprays containing 2 lb. 50 per cent. DDT paste with 1 lb. size powder or Perenox (a copper fungicide added as an adhesive and colouring material) or 1 lb. chlordane with the same adjuvants per 10 gals. water were applied to the lower 2 ft. of the trunks and main stems of 8, 59, 8 and 8 multiple-stem coffee trees, respectively. All the trees were free from ants after a month, and one of the trees receiving the first treatment was the only one infested after four months. A spray of 3 pints 27·5 per cent. chlordane emulsion concentrate and 1 lb. Perenox per 10 gals. water resulted in 13 of 31 trees uninfested after three months. By the end of the fourth month, the mealybug had been practically eliminated by parasites and predators from trees on which the ant had been controlled by DDT with Perenox, but both ant and mealybug were still active on untreated trees.

In 1953, the trunks of multiple-stem coffee trees were sprayed in a band about a foot wide, 1,200 with 1 per cent. DDT and 150–600 with various concentrations of dieldrin in emulsion sprays. Examination of random samples of 12 trees showed three and nine infested 12 and 72 days, respectively, after treatment with DDT, none infested 10–70 days after treatment with 1·5 or 0·75 per cent. technical dieldrin, none after five and five after 65 days with 0·325 per cent. dieldrin, and none after 16 and eight after 65 days with half this concentration; of 12 untreated trees, 10, 9 and 12 were infested at the beginning of the experiment and 12 and 72 days later. The ants were extremely active and numerous on all untreated trees at the end of the experiment. It is considered that the reduced effectiveness of DDT in this test may have been due to the narrowness of the band treated and that the most economical effective concentration of dieldrin is between 0·375 and 1·5 per cent.

Brown (E. S.). **The Biology of the Coconut Pest *Melittomma insulare* (Col., Lymexylonidae), and its Control in the Seychelles.**—*Bull. ent. Res.* **45** pt. 1 pp. 1–66, 6 pls., 17 figs., 55 refs. London, 1954.

A detailed account is given of comprehensive studies in 1952–53 on the bionomics and control of the Lymexylonid, *Melittomma insulare* Fairm., on coconut in the Seychelles, with some comparative observations in Madagascar. The local distribution and possible origin of the beetle are discussed. Observations on its life-history in general confirmed those of other workers [*cf. R.A.E.*, A **29** 340; **39** 286], but all stages were present throughout the year. Although they attack healthy palms, the larvae were always associated with bacteria, and some evidence was obtained that these

may be transmitted with the eggs. The larvae were shown to feed on fluid extracted from the parenchymatous tissues invaded by the bacteria, and not on solid wood. Palms were rarely attacked before coming into bearing, at about seven years of age, and when the beetle was present, were usually killed by it before the age of 60 or 70 years. The larvae enter the trunk near its base or at wounds higher up and tunnel vertically in the sappy central tissues. The necrosis associated with their feeding spreads rapidly in these tissues to a height of about 3 ft. above ground level, and the damaged wood finally rots and is broken down by secondary pests, ultimately leaving a central cavity. Few larvae of *M. insulare* are still present at this stage, and the infestation sometimes dies out. Despite the damage, an outer ring of sound vascular tissues may support the tree for a considerable time and enable it to produce crops, and adventitious roots give additional support if they penetrate the soil, but the tree is liable to be blown down during gales. *M. insulare* is not thought to be primarily responsible for dying-off of the crown [*cf.* **26** 433].

Superficial infestations, with no rotting wood, were common in palms 7–25 years of age, whereas infestations with large quantities of rotten wood were most characteristic of older trees, and hollow trees were invariably at least 25–60 years old. The severity of the damage depended not only on the number of larvae present, but also on the number of separate infestations and their distribution round the trunk. Owing to the length of the life-cycle, several years may elapse before infestation is noticed, and spread from one plantation to another may be slow. There are no reliable external signs of attack, but the bark at the base of infested trunks sometimes becomes rusty in colour or exudes gum, and superficial infestations can be recognised by the pellet-like frass and the cast larval tail-pieces, which are ejected from the ends of the tunnels. Other food-plants were *Stevensonia borsigiana*, which was abundant, widespread and fairly frequently infested, and three other native palms, but the wood of wild palms is usually too dry and hard for attack. High moisture content in the wood was found to be the most important factor favouring infestation, which was commonest on alluvial soils. The occurrence of a dry season was a limiting factor in Madagascar, but rainfall shows little seasonal variation in the Seychelles. Young palms and palms under shade, both of which have soft, sappy wood, were most susceptible.

The recommended methods of preventing and controlling infestation are discussed, and tests with insecticides described. For treatment by fumigation, the technique adopted was to cut off sufficient wood to expose the larval tunnels, remove rotten wood, apply the chemicals in the cavity, pack coconut husks into and over the latter, and earth up well. After preliminary tests, four materials were tested on a large scale, of which p-dichlorobenzene was the most consistently effective, giving complete mortality of all larvae in 25 of 37 trees and killing 95·7 per cent. of the larvae in all of them; it also gave good control of the pupae and adults. It was mostly used at a rate of 250 gm. per palm, but 125 gm. or less was satisfactory for superficial infestations, and up to 375 gm. was used for extensive ones. The other materials tested were emulsion sprays of aldrin, dieldrin and γ BHC, and they were applied at 1·22–2·44, 0·925–1·85 and 0·5–1 per cent. active ingredient, respectively, at least 500 cc. spray per palm being usually necessary to cover the exposed surface. Aldrin was the best of them, giving complete mortality in 14 of 24 palms and killing 93·76 of all larvae; the concentration and rate of application appeared immaterial, and all three were less economical and convenient to apply than p-dichlorobenzene. The fumigants required 2–3 months to exert maximum control and had little or no effect on the associated bacteria; their success

depended largely on the thoroughness with which affected wood was removed and earthing up performed. Painting the exposed tunnels with tar and burning round the base of the tree after removing affected wood, the two main measures hitherto recommended, were less effective and more difficult to carry out than fumigation with p-dichlorobenzene, though tar is probably the best treatment for infestations too high up the trunk for satisfactory earthing. Aldrin and dieldrin sprayed round the base were of little value in preventing or controlling infestation, and three systemic insecticides, schradan, Systox (50 per cent. O,O-diethyl O-2-(ethylmercapto) ethyl thiophosphate) and bis(dimethylamino) fluorophosphine oxide, which it was thought might be of value owing to the larval habit of feeding on fluid, were ineffective when applied by means of holes in the trunk.

Preventive measures recommended comprise planting as far as possible on coral sands, if not too wet; the establishment of plantations of mixed age; avoiding practices such as planting among other trees or along the edges of marshes, which favour the growth of a soft, sappy trunk, and cutting steps in the trees, at least within a few feet of the ground, which may afford points of entry; and carefully watching trees 15–25 years of age for signs of infestation. Poorly cropping trees on dry, eroded hillsides, which provide foci of infestation, should be fumigated and subsequently walled round and earthed up to improve production or, if seriously affected, destroyed. Manurial treatment may assist the recuperation of infested palms. The bases of palms that have fallen owing to attack should be burnt immediately and the whole trunk eventually destroyed to prevent the spread of infestation, and coconut wood should not be transported from infested to uninfested islands in the group.

Yeo (D.) & Thompson (B. W.). **Aircraft Applications of Insecticides in East Africa. V. The Deposition in open Country of a coarse Aerosol released from an Aircraft.**—*Bull. ent. Res.* **45** pt. 1 pp. 79–92, 4 figs., 14 refs. London, 1954.

This paper is the fifth of a series of which the first four were concerned with applications of aerosols in woodland for control of *Glossina* and have been noticed elsewhere [*R.A.E.*, B **41** 211; **42** 23]. When an aerosol is released over woodland, its eventual distribution is influenced by atmospheric turbulence in the free air above the canopy and by air movement within the canopy. The latter is a function of the nature and density of the trees and the condition of the free air. Simplification of the many variables is necessary in studies designed to yield ordered knowledge, and those described in this paper were concerned with the deposition on open country of a coarse aerosol (with a mass median diameter of 80 μ) released from an aeroplane flying at about 30 ft. and formed part of an investigation into the possibilities of applying insecticides from aircraft to control insect pests in East Africa.

The following is virtually the authors' summary. It is shown that the rate at which the aerosol is deposited is greatly affected by the degree of atmospheric turbulence, a practical measure of which is described. The rate of deposition is approximately inversely proportional to the time interval elapsing between production of the aerosol and deposition, except for deposits laid down near the line of emission. Droplets less than 10 μ in diameter are not deposited appreciably within any useful time interval, and it would be most uneconomical to attempt to produce deposits upon the ground by using drop spectra consisting mainly of such small droplets.

The solution used was a 10 per cent. w/v solution of technical DDT in

equal parts of Shell Power Kerosene and Shell Diesoline. Evaporation of the volatile constituents takes place very rapidly during the first few seconds after production of the droplets, and deposits formed immediately beneath the aircraft track have lost 50 per cent. of their initial volume. Solvent losses increase significantly with time, but so slowly that for most practical purposes the solution strength of the ground deposit is very nearly constant for all important sampling points.

A general discussion is given of the dosages received by an insect, and it is indicated in a general way that in tropical Africa there are only short periods of daylight during which aerosols may be used most effectively. The ground deposition in open country is only one aspect of the complex problem of aerosol behaviour; other important aspects are indicated.

WAY (M. J.). **Studies on the Life History and Ecology of the Ant** *Oecophylla longinoda* **Latreille.**—*Bull. ent. Res.* **45** pt. 1 pp. 93–112, 1 pl., 4 figs., 37 refs. London, 1954. **Studies on the Association of the Ant** *Oecophylla longinoda* **(Latr.) (Formicidae) with the Scale Insect** *Saissetia zanzibarensis* **Williams (Coccidae).**—*T.c.* pp. 113–134, 1 pl., 8 figs., 25 refs.

Oecophylla longinoda (Latr.) was found tending the Coccid, *Saissetia zanzibarensis* Williams, on clove in Zanzibar [*R.A.E.*, A **41** 447], and in view of this and of its value in controlling the Coreids referred to as *Theraptus* sp. on coconut there [**42** 40], studies of its bionomics and ecology were made in Zanzibar, the results of which are given in the first paper. The following is based mainly on the author's summary. *O. longinoda* is common in forests along the coasts of Kenya and Tanganyika and on the islands of Zanzibar, Pemba and Mafia, and also occurs in Uganda. In Zanzibar, where it is represented by var. *textor* Santschi, it colonises at least 89 species of trees and shrubs; the largest populations occur on clove, *Citrus*, *Bridelia micrantha* and *Canthium zanzibaricum*. The nesting habits and colony composition of *O. longinoda* are such that one colony may spread over a number of adjacent trees; each contains only one gravid queen. Winged sexual forms leave the nests at the beginning of the wet seasons, in February–March and October–November, and, after the nuptial flight, new colonies are founded by single queens, who use their food reserves to bring the first batch of brood to maturity. The workers tend a wide range of Homoptera that produce honey-dew, but most were associated with Coccids, notably species of *Saissetia*. The insects preyed on by *O. longinoda* include honey bees and the driver ant, *Dorylus nigricans* Ill., of which large numbers are sometimes destroyed. In discussing the risk that Homoptera tended by *O. longinoda* may become pests, the author points out that Aphids and mealybugs, which may include vectors of plant viruses, are tended only when other Coccids, which are not known to act as vectors, are scarce or not available. The amount of mechanical damage caused by the Coccids is directly related to the numbers of the attendant ant colony, and in Zanzibar appears to be heaviest on small trees and shrubs, such as coffee and cacao; relatively small colonies effectively control *Theraptus* on coconut palms, which appear to be unable to support large populations, and the damage caused by the Homoptera is insignificant compared with the benefits derived. The establishment of colonies of *O. longinoda* is hindered by the need for the presence of a fertilised queen in each colony, antagonism between colonies, and attack by other ants [*cf.* **42** 42]. Interplanting appears to be beneficial, and dense populations of *O. longinoda* were found in coconut plantations only where the palms were interplanted with clove

and other more favoured trees. The extension of colonies is favoured by a closed canopy of foliage or other connection between the trees.

The second paper comprises an account of studies on the close relation between *O. longinoda* and *S. zanzibarensis*, which is abundant on clove in Zanzibar, but was not found in the absence of the ant, and the following is again based on the author's summary. In the absence of *O. longinoda*, contamination by honey-dew and sooty moulds prevents the increase of *S. zanzibarensis* above a low level, while, in addition, insect parasites and probably also predators virtually exterminate the Coccid. Under humid conditions, examples contaminated with honey-dew were destroyed by fungi. *O. longinoda* prevented this contamination and gave absolute protection from predacious Coccinellids and, although it did not prevent parasitism by *Coccophagus* spp. or attack by *Eublemma* spp., the mortality due to these was of little significance. The ants also removed débris from the *Saissetia* clusters and transported the nymphs to suitable feeding sites. The effect of these benefits was most marked when the ant population was high in comparison with that of *Saissetia*. Silken shelters built over the clusters by the ants protected the latter during adverse weather and may only incidentally benefit the Coccid. *S. zanzibarensis* and other Homoptera that produce honey-dew provided the major food source for *O. longinoda*; and other sources were sufficient to maintain only relatively low ant populations. The level of the *Saissetia* population depended on the level of the attendant ant population, and examples providing honey-dew in excess of the requirements of the ant colony were killed. When the ant was not attracted to the Coccid by the desire for honey-dew, its behaviour towards it resembled that adopted towards insects on which it normally preys.

Woodroffe (G. E.). **An additional Note on the Fauna of Birds' Nests in Britain.**—*Bull. ent. Res.* **45** pt. 1 pp. 135–136, 2 refs. London, 1954.

The author makes a few corrections and additions to his recent paper on insects and mites found in birds' nests in Britain [*R.A.E.*, A **42** 43] and states that examination of the membranous wings of certain species of *Ptinus* has shown that they are functional only in the males, so that these species cannot colonise the nests by flight.

McIntosh (A. H.). **Temperature Coefficients of Insect Kill by volatile solid Insecticides.**—*Bull. ent. Res.* **45** pt. 1 pp. 137–139, 10 refs. London, 1954.

Some commercial fumigants have been found more effective at low temperatures, especially temperatures below 10°C. [50°F.], than at higher ones [*cf. R.A.E.*, A **23** 258; **24** 412; **25** 769]. In view of this, the relative effectiveness of three volatile, solid fumigants, p,p′fluoro-DDT (melting point 42–43°C.), γ BHC (m.p. 109·5–111°C.) and aldrin (defined as 1,2,3,4, 11,11-hexachloro-1,4,5,8,9,10-hexahydro-1,4,5,8-endo-exo-dimethylene-naphthalene [*cf.* **41** 2, 268, note], m.p. 98–99°C.), at 30 and 11°C. [86 and 51·8°F.] was investigated in the laboratory, adults of *Oryzaephilus surinamensis* (L.) and *Tribolium castaneum* (Hbst.) being used as the test insects. Adults of *O. surinamensis* in a tube closed with nylon fabric were placed in a petri dish containing crystals of the fumigant, whereas those of *T. castaneum* were placed directly on the bottom of a dish containing the fumigant in an open tube; the petri dishes were subsequently sealed, and mortality counts were made daily for five days, when mortality in some of

the controls reached 50 per cent. Mortality curves were plotted, and the periods for 50 and 90 per cent. kill obtained. Both species were killed more quickly at 11°C. by p,p′fluoro-DDT and at 30°C. by aldrin; γ BHC killed *O. surinamensis* more quickly at 11°C. and *T. castaneum* at 30°C. The relative humidity in the petri dishes was not controlled in these tests, but evidently did not influence the performance of the fumigants, since similar results were obtained in tests with *O. surinamensis* in which the relative humidity was kept at 100 per cent. by means of an open tube of water in each dish.

Wootten (N. W.) & Sawyer (K. F.). **The Pick-up of Spray Droplets by flying Locusts.**—*Bull. ent. Res.* **45** pt. 1 pp. 177–197, 2 pls., 12 figs., 7 refs. London, 1954.

Calculation of the expenditure of spray in the aerial curtain method of spraying flying locust swarms from aircraft [*cf. R.A.E.*, A **38** 480, etc.] required a determination of the horizontal equivalent area (defined as the horizontal plane area which, when passed through a curtain of droplets of a given diameter with the same velocity as a locust, collects the same number of droplets as the locust, and referred to as the HEA) and the toxicity of the spray as a function of droplet size. Measurements of these were made in a wind tunnel in which adults of *Schistocerca gregaria* (Forsk.) were suspended in such a way that natural flight was simulated and a spray of 20 per cent. w/w DNC in oil was applied. The tunnel, the balance from which the locusts were suspended, and the sprayer are described, and figured, and the following is substantially the authors' summary of the results.

The observed values of locust airspeed varied from 2·5 to 6·5 metres per second [5·6–14·5 miles per hour] with a mean of about 3·2 m. per second. The HEA of locusts in flight was obtained by emitting a dyed non-toxic oil spray of known droplet size into the wind tunnel in such a way that the angle of approach of the droplets to the locust was the same as in aerial curtain spraying and was determined as the ratio of the amount of spray picked up by a locust to the amount collected by unit area of a horizontal test plate under similar conditions. Results showed that the HEA varied with droplet size, decreasing rapidly from 445 sq. cm. for droplets with a diameter of 50 μ to 31 sq. cm. for a diameter of 300 μ. HEA values for droplets larger than 300 μ were not directly measured owing to the complication resulting from the fact that part of the droplets picked up on the wings are thrown off again. It is shown, however, that estimates of the HEA for droplets 500–1,000 μ in diameter, sufficiently accurate for practical purposes, can be made from the measurements at the smaller droplet sizes. The range of locust airspeeds encountered in the HEA measurements was insufficient for full determination of the effect of this factor on the HEA value. An analytical expression was developed from the experimental values that enabled the magnitude of the airspeed factor to be estimated.

The toxic efficiency of the DNC spray as a function of droplet size was determined similarly. The median lethal dose per gm. weight of locust increased from 6 mmg. DNC at 100 μ to 30 mmg. at 500 μ, most of the change taking place between 100 and 200 μ. The change of airspeed from 3 to 5 m. per second increased toxicity by a factor varying with droplet size between 40 and 90 per cent. The increased effectiveness of the smaller droplets appeared to be due to collection on the head and a more even contamination.

When the experimentally determined values were used to calculate the expenditure of spray required in the field, it was evident that a coarse spray

(mass median diameter 400 μ) is on the whole less effective than a fine spray (mass median diameter 200 μ), and it appeared that greater efficiency would be obtained by attacking a flying swarm layer by layer from the top rather than by vertical sections from the front as originally envisaged [**37** 314].

Arnold (J. W.). **The Haemocytes of the Mediterranean Flour Moth,** *Ephestia kühniella* **Zell. (Lepidoptera: Pyralididae).**—*Canad. J. Zool.* **30** no. 6 pp. 352–364, 3 pls., 3 figs., 13 refs. Ottawa, 1952. **Effects of certain Fumigants on Haemocytes of the Mediterranean Flour Moth,** *Ephestia kühniella* **Zell. (Lepidoptera: Pyralididae).**—*T.c.* pp. 365–374, 3 pls., 2 figs., 9 refs.

The haemocytes of insects have been reported to play some part in defence against foreign materials, including certain insecticides, but little is known of their functions. These were studied in *Ephestia kuehniella* Zell., and an account of the work is given in these two papers. The following is largely the author's summary of the first. The haemocytes of *E. kuehniella* were classified as prohaemocytes, plasmatocytes, spheroidocytes and oenocytoids, by a modification of Yeager's classification for *Laphygma* (*Prodenia*) *eridania* (Cram.). Total cell numbers increased gradually during larval life and reached their maximum in the prepupae. They decreased markedly during the pupal stage and remained at a low level in the adults. Plasmatocytes and spheroidocytes accounted for more than 90 per cent. of the total cells in most stages. The plasmatocytes were in the majority during most of the larval life but were superseded by the spheroidocytes in the prepupae. The spheroidocytes also increased in numbers when larvae were subjected to certain abnormal conditions. Histochemical tests showed that the spheroidocytes were sites for the accumulation of neutral fats just before pupation.

The following is almost entirely the author's summary of the second paper. A study was made of the effects of fumigation with dichloroethyl ether, carbon tetrachloride and methyl bromide on the haemocytes of larvae of *E. kuehniella*. Cytological changes, total cell numbers, and the relative numbers of cells of each class were noted at intervals during and after fumigation. All treatments caused the cells to change from the passive to the active state (as defined by Yeager) and induced pathological conditions leading to cell degeneration and significant decreases in cell numbers. Total cell numbers decreased further in individuals that failed to recover from fumigation. Recovery was associated with regenerative changes that resulted in increased cell numbers. The spheroidocytes were the principal cells involved in the increases, and they were loaded with globules of neutral fats at that time. It is suggested that the spheroidocytes are associated with recovery, possibly through an ability to aid in the creation of fat reserves for energy metabolism under unfavourable conditions.

Pielou (D. P.). **The nonmutagenic Action of** *p-p'*-**DDT and** γ-**hexachlorocyclohexane in** *Drosophila melanogaster* **Meig. (Diptera: Drosophilidae).**—*Canad. J. Zool.* **30** no. 6 pp. 375–377, 9 refs. Ottawa, 1952.

The following is virtually the author's summary. As experiments are in progress on selective breeding for insecticide tolerance in insect parasites [*R.A.E.*, A **41** 376, etc.] and as various physiologically potent chemicals have been shown to cause mutation in *Drosophila melanogaster* Mg., tests were made to determine whether p,p'DDT and γ BHC had any mutagenic

action. Wild-type males of *D. melanogaster* that had been exposed to the former insecticide in their larval feeding medium, or, as adults, to the vapour of the latter insecticide, were tested. The Muller-5 method of detecting recessive lethal mutations in the X chromosome was used. No evidence of mutagenic action was found in either insecticidal isomer.

Wright (D. W.). **The Control of the Carrot Fly (*Psila rosae* Fab.) with Benzene Hexachloride.**—*1st Rep. nat. Veg. Res. Sta. 1949–50* pp. 14–20, 5 refs. Wellesbourne, 1951.

Poison baits or DDT sprays applied to sites affording shelter to the adults of *Psila rosae* (F.) [*cf. R.A.E.*, A **31** 229] have effectively protected carrot crops from infestation in eastern England except when the surrounding cover is very heavy or the plots small. In tests with BHC in 1945–46, dusts of the crude material applied to seedling carrots at high rates gave almost complete control of heavy infestations, but caused considerable tainting of the crop and of potatoes and other root crops grown on the same site in the following year. In further work during 1947–49, one or two applications along rows of early-sown carrots of a dust containing crude BHC (12·5 per cent. γ isomer) at rates of 3·7 or 4·5 lb. BHC per acre gave effective control of both first and second generations of *P. rosae* and, when only one application was made, did not affect the flavour of the carrots, but broadcast applications prior to sowing at 2·8 and 4·2 lb. BHC per acre gave very imperfect control of the second generation. In 1950, when the BHC used contained 90 per cent. γ isomer, good control of the first generation was obtained by applying BHC in a dust along the rows at 4·8 oz. BHC per acre in May, as an atomised solution in tractor vaporising oil at 12 oz. BHC per acre in May or at 9·1 oz. in May and again in June, as a dust broadcast over the seed-bed at 12·3 or 16·4 oz. BHC per acre prior to sowing, or as a seed treatment in the form of a 40 per cent. dust, at 2·5 parts dust to 100 parts seed by weight, and the double application of the solution was outstandingly effective. None of the treatments controlled the second generation, and this is attributed to vaporisation of the BHC as a result of the high temperatures reached by fen soil in summer. In experiments on a gravelly clay loam, treatments applied against the first generation also caused significant reductions of the second, the most effective being a dust applied to the seed-bed at 17·8 oz. BHC per acre and treatment of the seed-bed at 12·3 oz. followed by an application to the rows of the atomised solution in oil at 5 oz. BHC per acre. In tests of treatments against the second generation on June-sown carrots significant reductions were given only by two applications of the spray on 1st and 16th August at 11·9 and 16·6 oz. BHC per acre, respectively, or one on the earlier date at 17·9 oz. No deleterious effects on flavour were noted in any of the tests in 1950. The evidence indicates that application to the rows is the most economical method of use.

Dunn (J. A.). **Pea Aphid Population Studies in 1950.**—*1st Rep. nat. Veg. Res. Sta. 1949–50* pp. 21–26, 1 fig. Wellesbourne, 1951.

Population trends in *Macrosiphum* (*Acyrthosiphon*) *pisum* (Harris) on *Medicago lupulina* and peas were studied in Essex during 1950 as part of an investigation on the bionomics and control of this Aphid. *Macrosiphum* overwinters almost exclusively in the egg stage on perennial leguminous plants, especially lucerne and *Medicago lupulina*. The fundatrices hatch in late February or March, and migrants appear in the second generation of

fundatrigeniae. Large-scale migration to peas and other summer food-plants takes place in May and early June, but large populations can be maintained on the winter food-plants during summer and autumn if these are periodically cut, so that young growth is produced. There is a return migration in autumn, when sexual forms occur.

Population changes on *M. lupulina* from 3rd May to 26th June and during October and November are shown on graphs. The peak was reached on 13th June, after which there was a sharp decline, and the Aphids had virtually disappeared by the time the crop was cut. The proportion of immature alates increased throughout the sampling period. In early October, the returning migrants had almost disappeared, and only one was taken. Males and oviparous females first appeared on 18th October, after which females predominated and the sexual forms became progressively more numerous, and a small peak occurred on 25th October, owing to the presence of large numbers of immature Aphids. On pea, the population became increasingly abundant during June and reached injurious numbers during the third and fourth weeks, after which control measures were applied.

Some information was also obtained on natural control on both winter and summer food-plants. Coccinellids, primarily *Coccinella septempunctata* L., were the predominant predators on *M. lupulina*, the adults being most numerous in early June and larvae in late June and early July, and afforded considerable control. Syrphid larvae were scarce, and parasitism remained at the low level of about 20 per cent. reached on 11th May. Peas to which Aphids had migrated from an adjoining crop of *M. lupulina* were also invaded by *C. septempunctata* four or five weeks later, but Syrphids from another source were of greater importance. Parasites migrated from *M. lupulina*, but their dissemination over the peas was slow. Further reductions in numbers were due to fungi and unfavourable weather.

Wheatley (G. A.). **Investigations on insecticidal Dusts.**—*1st Rep. nat. Veg. Res. Sta. 1949–50* pp. 27–34, 5 refs. Wellesbourne, 1951.

Dusts containing up to 4 per cent. DDT by weight in a diluent alone or impregnated with a non-volatile oil failed to control *Macrosiphum* (*Acyrthosiphon*) *pisum* (Harris) in eastern England in 1947, although weather conditions were good, the equipment was efficient, and dusts of similar specifications had proved satisfactory in the United States. The failure was thought to be due either to the method of incorporating the DDT into the carrier or to the characters of the latter, and since little information was available on the importance of either factor, studies on characteristics desirable in insecticidal dusts applied from the ground were begun in 1948.

Various methods have been used to determine the distribution of particle-sizes in insecticidal dusts, and the most useful is probably one based on Stokes' law, by which the terminal velocity of a small sphere falling under the action of gravity through a viscous medium is related to its radius and density and to the density and coefficient of viscosity of the medium, the terminal velocity of the particles being determined experimentally and the radius of an equivalent sphere subsequently calculated. To separate dust particles into a range of sizes by this method, an air elutriator was devised. Air was bubbled through a conical container holding the dust and passed by means of a long, wide, vertical, glass fractionation tube fitted in the top to a flask in which the dust particles were filtered out. A manometer recorded the volume of air leaving the tube per minute, from which the velocity in the tube was calculated. When this velocity was constant, the largest particles carried up by the air were those of which the terminal

velocity downwards was slightly less than the upward air velocity; in calculating the radius of the equivalent sphere, the known air velocity was substituted for the terminal velocity of the particle. A low air velocity was first used to remove the finest particles, and the velocity was then successively increased until a complete series of fractions had been procured. Data from the size-range analysis of a dust of 4 per cent. DDT in talc, which are given to illustrate the results obtainable, indicated that for each fraction, increased diameter of the particles was accompanied by increased bulk density, fluidity and colour intensity.

In field tests of the effectiveness of dusts containing 0·5, 1, 2 or 4 per cent. DDT prepared in the laboratory by impregnation of the talc diluent with a solution of DDT in benzene by a method that is described, and a ball-mixed dust of orthodox type containing 4 per cent. DDT in talc against *M. pisum* on peas in June 1950, the ball-mixed dust proved little more effective than the 0·5 per cent. impregnated dust and inferior to all the rest.

Dicker (G. H. L.). **Some Notes on the Biology of the Apple Sawfly, *Hoplocampa testudinea* (Klug).**—*J. hort. Sci.* **28** no. 4 pp. 238–245, 2 pls., 1 fig., 14 refs. London, 1953.

Investigations on the bionomics of *Hoplocampa testudinea* (Klug) on apple in Kent in 1947–51 showed that the adults appeared on the trees soon after the first blossoms had opened, increased rapidly to a maximum within a few days of full-bloom and then declined in numbers. No adults were found on the trees before any open blossoms were present or after petal-fall was complete, though occasional examples occurred on the late blossoms after the 80 per cent. petal-fall stage had been reached. About 30 per cent. of the adults collected were males, and both sexes survived for averages of just over nine days in the laboratory. There was some evidence that the sawflies move from the early varieties shortly after full bloom, probably because freshly opened flowers are preferred for oviposition. The eggs were laid, usually singly, in the receptacle just below the base of the stamens. They were usually found on the same date as the first adults and increased rapidly in numbers until full-bloom, when at least half had been laid, after which the rate decreased. In the laboratory, females laid 5–103 eggs each, with an average of 32, and oviposition occurred very soon after emergence. Hatching normally began 4–5 days after 80 per cent. petal-fall and was virtually complete within 14 days; the average incubation period was estimated to be 14–15 days. The larva bored into the fruit soon after hatching, and when it had partly or completely consumed the seeds of one, attacked others, which could be recognised by the large entry holes. In 1949–51, 1–2 times as many fruits were injured by migrating larvae as by newly hatched ones. The larvae became full-fed after about four weeks and formed cocoons in the soil, where they overwintered as prepupae, pupating 3–4 weeks before adult emergence; 88 per cent. of the cocoons were found in the top six inches of soil, and none below nine inches. In observation cages, 40 per cent. of the larvae spent two winters in the prepupal stage, and as one larva collected in June 1949 and kept in the laboratory was still alive in June 1951, after the normal emergence period for adults, some may spend more than two.

These results are compared with those reported in the literature [*R.A.E.*, A **20** 579; **33** 359]. As spraying against this pest does not begin until 80 per cent. petal-fall, and as all petals have fallen before the spray is applied in most orchards or are knocked off by it, it seems unlikely that oviposition after spraying can account for past failures in control. As larvae may

remain in the soil for two winters, it is essential to obtain adequate control during at least two consecutive seasons before measures against the sawfly are relaxed.

COLLYER (E.). **Biology of some predatory Insects and Mites associated with the Fruit Tree Red Spider Mite** (*Metatetranychus ulmi* (**Koch**)) **in south-eastern England. IV. The Predator-Mite Relationship.**— *J. hort. Sci.* **28** no. 4 pp. 246–259, 6 graphs, 23 refs. London, 1953.

In this fourth part of a series [*cf. R.A.E.*, A **41** 158, etc.], the author discusses the relative importance of the various predators of *Paratetranychus pilosus* (C. & F.) (*Metatetranychus ulmi* auct.) on fruit trees in south-eastern England and compares the fauna of neglected and commercial orchards to show the changes due to the intensive control methods now used.

Observations made over five years in a neglected orchard containing mainly apple trees in Essex showed that populations of the predators and of *Paratetranychus* and other phytophagous mites remained fairly constant from year to year; many different species occurred, but none in excessive numbers. The predators included the Mirids, *Psallus ambiguus* (Fall.), *Atractotomus mali* (Meyer), *Orthotylus marginalis* Reut., *Malacocoris chlorizans* (Panz.), *Blepharidopterus angulatus* (Fall.) and *Phytocoris* spp., with smaller numbers of *Camptobrochis lutescens* (Schill.), *Plagiognathus arbustorum* (F.), *Deraeocoris ruber* (L.) and *Campyloneura virgula* (H.-S.), all of which have one generation a year and are active in succession from early April until October; the Anthocorids, *Anthocoris nemorum* (L.) and *Orius majusculus* (Reut.) and, less commonly, *A. nemoralis* (F.), *A. confusus* Reut. and *O. minutus* (L.), which have two generations a year and are present as adults or nymphs continuously from March until October and occasionally active in winter; and predacious Laelaptid mites, of which *Typhlodromus tiliae* Oudm., *T. finlandicus* (Oudm.) and *Phytoscius spoofi* (Oudm.) occur regularly in considerable numbers, feed from May to October and are also occasionally active in winter.

Sprayed orchards showed great variability in mite and predator populations. Fewer predacious species were present, although their populations were sometimes very high, and their relative abundance varied annually and from orchard to orchard. *B. angulatus* appeared first, in late June or later, when *Paratetranychus* has reached the second generation, and *A. nemorum*, *O. majusculus*, *Stethorus punctillum* Weise, *Oligota flavicornis* Erichson and *Campylomma verbasci* (H.-S.), though active in April–June, did not become numerous until July or later. They were often very abundant in August and September where mite populations were high, but not elsewhere. Laelaptid mites were only occasionally numerous, as they are susceptible to sulphur, but the Coniopterygid, *Conwentzia pineticola* End., sometimes appeared in late July [*cf.* **40** 69] and then increased very rapidly if conditions were favourable.

Paratetranychus has five generations a year in neglected orchards, but the population remained low in the one under observation, as predators were active throughout the summer. *Bryobia praetiosa* Koch, *Brevipalpus geisenheyneri* (Rübs.) and *Tetranychus* (*Eotetranychus*) *carpini* Oudm. were also present but all were controlled by the predators. The numbers of winter eggs of *P. pilosus* were low, and about 40 per cent. were destroyed before spring. In well-kept orchards, the observations indicated that spraying reduces predators by killing them directly or by destroying moss and lichen, which shelter them, the destruction of undergrowth removes sources of food and shelter, and regular pruning removes eggs and admits

light and air. Winter sprays greatly reduce predators that hibernate as adults, so that the initial spring population is low, and sprays applied after the blossom period may have still more marked effects. Some species, such as *S. punctillum*, *O. flavicornis* and *C. pineticola*, which have inactive soft-bodied larvae, are present in sprayed orchards but scarce in unsprayed ones, probably owing to competition from other predators. Predators that feed only on mites increase with the mite population, but more slowly, and die when the mite population fails, whereas those that feed on any available animal food, or also on plants, maintain their abundance at lower mite densities. When mite and predator populations are suddenly reduced by spraying, the mite increases again far more rapidly than the predators, and where constant spraying is practised, the ability of predators to reinfest the orchard from neighbouring unsprayed regions is important. Those most likely to do this are active species that live on other plants in hedges, ditches or woods. The Anthocorids and *S. punctillum* usually reappear quickly, whereas when *C. pineticola* disappears, it may not increase again for several years. Mirids are not very active, and although they occur on various plants near orchards, they migrate to fruit trees in only very small numbers. The proportion of winter eggs attacked in sprayed orchards could not be estimated accurately, but rose to 90 per cent. by the end of December in 1947 in one orchard in which *C. pineticola* was exceptionally active.

Appel (O.) & Richter (H.) Ed. **Viruskrankheiten.** [Virus Diseases.]—Sorauer (P.). *Handb. Pflanzenkr.* **2,** 6.Aufl., 1. Lief., 9½ × 6½ ins., xvi + 770 pp., 327 figs., 1 portr. Berlin, P. Parey, 1954. Price *DM.*150.

This first part of the sixth edition of the second volume of Sorauer's textbook [*cf. R.A.E.*, A **41** 333, etc.] is devoted to virus diseases of plants and comprises two main sections. The first, which is by E. Köhler, is general in scope and includes a chapter on the dissemination of viruses, in which the mechanism of transmission by insects is discussed. The second, which is by Köhler and M. Klinkowski, is arranged under the plants concerned, and here the vectors, if any, are named.

Heinze (K.). **Virusübertragungsversuche mit Blattläusen auf Dahlien, Gurken, Zwiebeln, Wasserrüben und einigen anderen Pflanzen.** [Virus Transmission Experiments with Aphids on Dahlias, Cucumbers, Onions, Turnips and some other Plants.]—*Z. PflKrankh.* **59** pt. 1–2 pp. 3–13, 5 figs., 11 refs. Ludwigsburg, 1952. (With a Summary in English.)

In the experiments described, Aphids collected in the field in Germany or taken from laboratory-reared stocks were starved for up to three hours and then placed in petri dishes on leaves of plants showing symptoms of virus diseases. After 10–25 minutes, they were transferred in batches to healthy plants and left for 20–24 hours. The results are shown in detail in a table and discussed, and the Aphids that transmitted each virus are classed as normal vectors when they feed and breed on the plants concerned and as occasional vectors when they are not normally found on them.

The normal vectors comprised *Myzus* (*Rhopalomyzus*) *ascalonicus* Doncaster, for yellow dwarf of onion (though it appeared to be a very poor vector) and turnip mosaic, *M.* (*Neomyzus*) *circumflexus* (Buckt.), for turnip mosaic, *Aphis* (*Doralis*) *fabae* Scop. and *M. persicae* (Sulz.), for poppy mosaic, and *Delphiniobium junackianum* (Karsch), for net mosaic of delphinium.

Rönnebeck (W.). **Weitere Beiträge zur Bekämpfung von** *Myzodes persicae* **Sulzer als Virusüberträger im Kartoffelfeld.** [Further Contributions to the Control of *Myzus persicae* as a Vector in Potato Fields.]— *Z. PflKrankh.* **59** pt. 1–2 pp. 13–26, 2 graphs, 19 refs. Ludwigsburg, 1952. (With a Summary in English.)

In further observations on the spring development of *Myzus* (*Myzodes*) *persicae* (Sulz.) on peach and its migration to potato near Bonn [*cf. R.A.E.*, A **41** 340] in 1951, the fundatrices hatched between 9th February and 17th March, and mass flight began on 17th May, approximately coinciding with the date of appearance of 75 per cent. of the ears of winter rye. This last relation was found to hold also for previous years and for another region (Schleswig-Holstein). The beginning of infestation of potato was better timed by means of the migration from peach than by counts of the Aphids on 100 potato leaves, which were not satisfactory in years in which migrants were scarce. The Aphid also overwinters on secondary food-plants, and the most important of these in the area was savoy cabbage [*cf.* **41** 185], especially when it was grown for seed. Migrants from cabbage flew only short distances, however, and are shown to be of very little importance in the transmission of potato viruses as compared with those from peach. Much virus transmission was found to occur before the end of June, when the crops are normally rogued, and it is suggested that treatment with a systemic insecticide as soon as migration from peach begins or when the plants show two leaves, if migration has already begun, might prevent this.

Risbec (J.). **Les insectes nuisibles au riz dans le Midi de la France.**— *Phytoma* **4** no. 32 pp. 11–17, 20 figs. Paris, 1951.

Rice is being increasingly grown in the Camargue region of south-eastern France, but is subject to serious attack by insects. In a survey of the species responsible for injury during the period of germination and early growth, it was confirmed that, contrary to popular belief, the larvae of *Ephydra riparia* Fall. and *E. macellaria* Egg., which attach themselves to the rice stems but do not feed on them, were harmless [*cf. R.A.E.*, A **1** 501; **5** 467; **32** 180]. The main pests were Chironomids. Larvae of *Chironomus* spp. were only indirectly harmful, sometimes damaging the roots by their tunnelling in the wet soil, but much injury was caused by *Cricotopus* spp., of which the commonest was *C. trifasciatus* Panz. The larvae of these species attack any tender growth, including the young roots and shoots of the germinating rice, and cause young plants to become uprooted and lost. They are less injurious once the plants have become established, though their feeding on the leaves at the water surface causes yellowing and retardation of growth. Infestation can be prevented by sowing on land that has been drained, by soaking the seeds so as to hasten germination, and by irrigating after or immediately before sowing, and controlled by applying a suitable insecticide in the irrigation water.

Larvae of the Ephydrid, *Hydrellia incana* (Stenh.) mine the leaves and have been stated to cause considerable injury, but are considered to be of only minor importance. Parasitism was heavy; about half the larvae of the second generation were found dead in their mines, and more than three-quarters of the pupae were attacked by parasites. Those reared by the author were the Braconids, *Chaenusa conjungens* (Nees), only one example of which was obtained, and a species of *Opius*, almost certainly *O. punctiventris* Thoms., which was common; the Braconids themselves in the pupae were parasitised by *Chrysocharis* sp. Descriptions of the adults of all three parasites are given in footnotes. Good control has been given by draining

the fields for 3–5 days and mixing a DDT insecticide with the irrigation water then admitted, which should cover the plants. *Elachiptera orizae* Séguy [**40** 64] was reported in 1949 as injuring rice in Camargue, but was not observed in August 1951.

When the young ears appear, some damage is caused by Orthoptera, which cut the stems just above the first internode. The most injurious was the Tettigoniid, *Homorocoryphus* (*Conocephalus*) *nitidulus* (Scop.). A species of *Sesamia* bores in the stems, and larvae of the Arctiid, *Celama henrioti* Warnecke, feed on the young spikelets, destroying the ovaries and stamens, though the species does not seem well adapted to rice.

Lhoste (J.) & Leibovici (C.). **Nouvelles utilisations de l'octamethylpyrophosphoramide.**—*Phytoma* **5** no. 35 pp. 17–19, 3 figs., 3 refs. Paris, 1952.

The results are given of experiments in 1951 on the treatment of broad-bean seeds and chrysanthemum cuttings with schradan for the control of Aphids. The bean seeds were soaked for 2–24 hours in solutions containing 1–0·12 per cent. schradan, dried and planted in groups of 15 in pots, which were buried in the soil. When the plants were 2–2½ ins. high, they were infested with *Aphis fabae* Scop. by placing pieces of heavily infested bean near them, and this was repeated three weeks later. Germination was little affected by the treatments, and growth was normal except when reduced by the Aphid. Infestation 36 days after sowing was severe on the control plants, which were from seed soaked in water only, slight after soaking for two hours in the 1 per cent. solution and negligible after soaking for longer periods at this concentration. It was also slight after 24 hours' soaking in 0·5 per cent. schradan, but proportionately greater for the lower concentrations; treatment for less than 24 hours with 0·5 per cent. schradan or less was ineffective. It is concluded that the best results are given by soaking for 24 hours with 1 per cent. schradan, which gives an absorption of about 0·015 gm. pure chemical per seed.

In the tests with chrysanthemum, cuttings 2–2½ ins. long were kept for 1½, 3 or 6 hours with their ends in solutions containing 1–0·12 per cent. schradan, planted in pots and infested with the chrysanthemum Aphid [*Macrosiphum sanborni* Gill.] every week for two months. Counts showed that the results were somewhat variable, but all the treatments afforded complete protection for two weeks and all those with 1 per cent. schradan for eight, though the plants remained stunted after six months for the longest dipping period. Treatment with 0·5, 0·25 and 0·12 per cent. schradan gave complete or almost complete protection for six weeks when the dipping periods were 3–6, 3–6 and 1½–3 hours, respectively, and 0·5 per cent. was effective for eight weeks when it was three hours. Treatment for 1½ hours at a concentration of 0·25–0·5 per cent. is recommended.

Missonnier (J.). **Le psylle du poirier,** *Psylla pyri* **L.**—*Phytoma* **5** no. 38 pp. 8–11, 7 figs. Paris, 1952.

Pear is attacked by several Psyllids near Paris, of which the commonest is *Psylla pyri* (L.). Observations on its bionomics in 1950–51 showed that the overwintered females oviposited between late January and early May. Eggs were laid first on the previous year's growth or in cracks in the trunks or older branches and later on the young buds and green parts. The nymphs fed on the lower surfaces of the leaves until the third instar, when they migrated to the new wood, or that of the previous year, and settled

on the petioles and peduncles. Adults emerged in May and paired, and the females oviposited after 7–8 days, each laying about 250 eggs. Adults of subsequent generations emerge at the end of June or beginning of July, and in August or early September, but in 1950, which was exceptionally warm, the third generation completed its development by the end of July and adults of a fourth appeared in September. All adults emerging from September onwards belonged to the overwintering form [*cf. R.A.E.*, A **41** 97] and did not oviposit until the following year. The principal damage is caused by the feeding of the nymphs, which affects the flow of sap and, in conjunction with the honey-dew and the fungi that develop on it in late summer and autumn, causes loss of leaves and a general weakening of the tree.

Sprays of DNC in oil applied in the late winter kill the overwintered adults and their eggs, but early spring treatments with parathion are recommended, experiments in 1951 having shown that this compound in emulsion or suspension sprays or with white oils gave good control of the Psyllid and other pests of pear when applied at bud-burst and was then relatively harmless to beneficial insects. Parathion should not be applied in summer unless infestation is heavy, as natural enemies are then susceptible, mite populations are liable to increase after treatment, large quantities of insecticide are needed to cover the foliage, and the nymphs on the underside of the leaves are difficult to reach. Emulsified solutions of BHC also gave good control and can be used with advantage in autumn to kill late nymphs and overwintering adults of *P. pyri* and also Aphids.

Tetefort (J.). **Collaboration dans la lutte contre les acridiens migrateurs dans le nord-ouest de Madagascar au cours de l'année 1951.** —*Phytoma* **5** no. 38 pp. 12–15, 4 figs. Paris, 1952.

Locusta migratoria capito (Sauss.) has caused considerable losses of rice and sugar-cane in north-western Madagascar since 1947. The current outbreak of this locust began in 1937, and the swarms spread in 1939–45 beyond the permanent breeding centres in the south and south-west of the island [*cf. R.A.E.*, A **28** 304]. Three-quarters of the total area is at present affected. Conditions are favourable in the north-west, where two generations develop each year, one from November to March and the other from April to September [*cf.* **39** 29]. Aeroplanes were first used in work against the locusts in 1949, and a campaign for the protection of crops in the north-west was begun in 1951. Its organisation and the methods adopted are described. The insecticide used was a dust of 20–25 per cent. BHC distributed at 7·2–9 lb. per acre, and it was applied to resting swarms in the early morning from aircraft flying at heights of some 16–65 ft. Mortality was highest among the young adults and when the dew was heavy and reached 80–95 per cent. under favourable conditions. It was much lower against old adults and under dry conditions, and the locusts often resumed flight before death occurred. Between May and December 1951, 700 swarms were destroyed and rice and sugar-cane were protected from all damage.

Menezes Mariconi (F. A.). **Alguns percevejos das frutas.** [Some Fruit Bugs.]—*Biológico* **18** no. 11 pp. 181–187, 4 figs., 7 refs. São Paulo, 1952.

Adults of the Coreids, *Leptoglossus gonagra* (F.), *L. fasciatus* (Westw.) and *L. stigma* (Hbst.), which were common, and *Holymenia clavigera* (Hbst.), which was rare, were recently found attacking the flower buds

and fruits of cultivated guava in São Paulo, Brazil; all are described, other plants attacked by them are recorded, and notes are given on their distribution [*cf. R.A.E.*, A **19** 552; **25** 378; **30** 98]. *L. gonagra* was the most important. Its natural food-plant, on which the immature stages develop, is *Momordica charantia* [**19** 552]. In plantings where this weed is abundant, the nymphs may also cause considerable damage to guava. When feeding on the fruits, the adults of *Leptoglossus* spp. punctured the skin and sucked the juice, causing young guavas to fall.

The control measures recommended against *L. gonagra* include the destruction of *M. charantia* in and near orchards. In tests of sprays, an emulsified solution containing 0·056 per cent. pure γ BHC gave good results against the adults of all species, and 0·016 per cent. parathion was also effective, but 0·25 per cent. methoxy-DDT and 0·2 per cent. chlordane were useless.

Schwember Orrego (O.). **Experimentos fototrópicos con escarabeidos chilenos.** [Experiments on Phototropism in Chilean Lamellicorns.]—*Agric. téc.* **13** no. 1 pp. 40–47, 1 graph, 16 refs. Santiago, Chile, 1953. (With a Summary in English.)

With a view to the possibility of using light-traps against *Hylamorpha elegans* (Burm.) and *Brachysternus prasinus* Guér., the larvae of which are injurious to cereal crops and pastures in southern Chile [*cf. R.A.E.*, A **41** 420], experiments were carried out in 1949–52 in which adults of these Rutelids were exposed to lights of various colours and intensities in an apparatus similar to that used by Peterson & Haeussler [**17** 42]. The results, which are presented in detail, showed that both species are attracted to light, the most attractive colours being, in descending order, various shades of red, blue and green. In the range of 60–200 watts, the degree of attraction was proportionate to the intensity of the light used.

Düzgüneş (Z.). **Important Mites in Turkey.**—*Tomurcuk* **2** no. 24 p. 7. Istanbul, 1953.

In recent years, fruit trees in Turkey have been increasingly attacked by mites. Several Eriophyids have long been present, and another, *Aceria sheldoni* (Ewing), was observed on *Citrus* in the south of the country in 1950 [*cf. R.A.E.*, A **40** 222]. *Brevipalpus geisenheyneri* (Rübs.) (*pyri* Taher Sayed) is important on apple in some districts with a favourable climate, and *Bryobia praetiosa* Koch, the most important of the Tetranychids present, and *Tetranychus atlanticus* McG., which has not yet been recorded from Europe, but was observed in Turkey in 1950, both cause severe damage to apple in central Anatolia. *T. telarius* (L.) (*althaeae* v. Hanst.) is of less importance. Hibernation in the adult stage occurred in both *T. atlanticus* and *T. telarius*, but whereas it was obligatory for the former, it was not so for the latter.

Laoh (J. P.). **De bestrijding van *Helopeltis* met DDT- en andere chloorhoudende insecticiden.** [The Control of *Helopeltis* with DDT and other chlorinated Insecticides.]—*Bergcultures* **22** no. 5 pp. 84–88, 3 refs. Djakarta, 1953. (With Summaries in English and Indonesian.)

The occurrence of blister blight (*Exobasidium vexans*) on tea in Java has to some extent masked the gravity of infestation by *Helopeltis theivora* Waterh. and *H. antonii* Sign., but in tests, control of these bugs with modern insecticides almost doubled the yield obtained. In field experiments

in 1951–52 with DDT sprays at about 18 gals. per acre, 0·25 per cent. of a 50 per cent. wettable powder was compared with an emulsified solution consisting of 0·3 per cent. Arkotine D 15 (15 per cent. DDT with a synergist) in water and with 0·1 per cent. Supona D 50 (a concentrate containing oil and 50 per cent. DDT suspended in the form of fine crystals [*cf. R.A.E.*, B **40** 111]). Arkotine formed a stable emulsion in water, but the oil in Supona D 50 tended to float on dilution. The sprays were applied on 26th November and again on 5th December, and heavy rain fell in the next two months. All three materials considerably reduced infestation within a fortnight, as compared with the controls, Supona D being much the most and the wettable powder the least effective, and the toxic effects were still apparent six weeks after treatment. Infestation on the controls then fell, probably owing to the rain. It is concluded that Arkotine and Supona D were about equally effective.

Some evidence of the development of resistance to DDT in *Helopeltis* was observed by growers during the year following the tests, and since it is desirable to alternate insecticides so as to avoid this and spare natural enemies, the use of other materials against the bugs is discussed from earlier investigations. These showed that toxaphene was more effective than derris, but less so than DDT or BHC. A dust of 5 per cent. technical BHC has for several years been used against *Helopeltis* on cacao, with no reports of diminishing effectiveness, but the technical product cannot be recommended for use on tea, owing to tainting. Lindane (almost pure γ BHC) is safe and if imported almost undiluted and mixed with local dust carriers would prove inexpensive. In tests in central Java, aldrin and dieldrin appeared to be about five times as effective as DDT against *Acrocercops cramerella* (Sn.) on cacao, and it was observed that *Helopeltis* was controlled on cacao dusted with dieldrin. Owing to the more persistent toxicity of the latter, aldrin may prove more useful on tea, on which toxic residues are undesirable.

Papers noticed by Title only.

Slater (J. A.) & Davis (N. T.). **The scientific Name of the Tarnished Plant Bug** [*Lygus lineolaris* (P. de B.) (= *oblineatus* (Say))] **(Hemiptera, Miridae).**—*Proc. ent. Soc. Wash.* **54** no. 4 pp. 194–198, 9 figs., 19 refs. Washington, D.C., 1952.

Thompson (W. R.). Ed. **A Catalogue of the Parasites and Predators of Insect Pests. Section 2. Host Parasite Catalogue. Part 2. Hosts of the Hymenoptera (Agaonidae to Braconidae).**—$10\frac{3}{4} \times 8\frac{1}{2}$ ins., [1+] ii + 190 pp. multigraph. Ottawa, Ont., Commonw. Inst. biol. Contr., 1953. Price $ (Canad.) 2.80. (Also obtainable from the Commonw. agric. Bur., Farnham Royal, Bucks, price £1.) [*Cf. R.A.E.*, A **32** 106; **40** 32.]

Beĭ-Bienko (G. Ya.), Bogdanov-Kat'kov (N. N.), Fal'kenshteĭn (B. Yu.), Chigarev (G. A.) & Shchegolev (V. N.). **Agricultural Entomology. Pests of agricultural Crops and Measures for their Control.** [*In Russian.*]—2nd edn. revd., 764 pp., 267 figs., 5 pp. refs. Moscow, OGIZ, 1949. Price 15 *rub.* [*Cf. R.A.E.*, A **35** 40.]

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